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HEALTH AND SAFETY PLAN FOR REMEDIAL INVESTIGATION AT SITE 43 NAS
PENSACOLA FL
7/1/2004
TETRA TECH

**Health and Safety Plan
for the
Remedial Investigation
at
Site 43
Located At
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0355**

July 2004

**HEALTH AND SAFETY PLAN
FOR THE
REMEDIAL INVESTIGATION
AT
SITE 43**

**LOCATED AT
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION-NAVY (CLEAN) CONTRACT**


**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

**Submitted by:
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**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0355**

JULY 2004

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1.0 INTRODUCTION

The objective of this Health and Safety Plan (HASP) is to provide the minimum safety practices and procedures to Tech NUS (TtNUS) personnel conducting monitoring well installation and multi-media sampling activities in support of the Remedial Investigation activities at Site 43 located at Naval Air Station Pensacola, located in Pensacola, Florida.

Authorization: This Health and Safety Plan (HASP) and the work described herein have been completed under the authorization of:

Contract: Comprehensive Long Term Environmental Action – Navy (CLEAN) – Southern Division Naval Facilities Engineering Command

Contract Number: N62467-94-D-0888

Contract Task Order Number (CTO): 0355

Statement of Work/Application: SOW #374. This HASP will support the following activities

- Mobilization/Demobilization
- DPT - Surface and subsurface soil sampling
- Hollow Stem Auger (HSA) Drilling and Monitoring Well Installation
- Multi-media - Groundwater Sampling
- Monitoring Well Development
- Aquifer Testing – Slug Testing
- Decontamination
- Geographical Land Surveying
- IDW Management

Proposed Dates of Work: July 2004 until completion (See work plan for detailed schedule).

Compliance: The elements of this HASP are intended to be in compliance with the requirements established by:

- OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER)
- Applicable sections of 29 CFR 1926 "Safety and Health Regulations for Construction."
- Tetra Tech NUS Health and Safety Program
- NAS Pensacola Policies and Procedures, where and as applicable.

This HASP must be accompanied by the Tetra Tech NUS, Inc. Health and Safety Guidance Manual (TtNUS HSGM). The Guidance Manual provides additional information in the areas of program support, standard operating procedures, and safe work practices.

Modifications/Changes: This HASP has been prepared using the latest available information regarding known or suspected chemical contaminants and potential and foreseeable physical hazards associated with the planned work at NAS Pensacola. The following conditions are considered sufficient basis review and possible changes to this document

- The addition or modification of activities/tasks outside of those specified in Section 4.0, Scope of Work.
- New information becomes available through the course of the investigation or from outside sources.

All changes to this HASP will be requested through the Task Order Manager (TOM) to the Tetra Tech NUS Health and Safety Manager (HSM). It is the responsibility of the TOM to notify all affected personnel of all changes to this HASP.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibilities for site safety and health for TtNUS and subcontractor employees conducting environmental sampling and other field activities. Personnel assigned to these positions shall exercise the primary responsibility for on site health and safety. These persons will be the primary point of contact for any questions regarding the safety and health procedures and the selected control measures.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project. This includes
 - Providing background and historical information regarding the sites to be investigated.
 - Providing points of contact at the facility for emergencies and day to day operations.
 - Provide coordination between Tetra Tech NUS, Inc. and NAS Pensacola.
- The PHSO is responsible for the development of this HASP in accordance with applicable OSHA regulations as specified in Section 1.0 and to serve as technical support regarding all matters of health and safety as it may pertain to the tasks to be completed and this scope of work.

- The TtNUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SHSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.
- The SHSO supports site activities by advising the FOL on all aspects of health and safety on site as they may pertain to regulatory requirements or task related hazards. These duties may include:
 - Verification of training and medical status of on-site personnel in relation to site activities.
 - Assist and represent TtNUS coordinating emergency services (if needed)
 - Providing elements site-specific training for on site personnel.
 - Coordinating health and safety activities
 - Selecting, applying, inspecting, and maintaining personal protective equipment
 - Establishing work zones and control points
 - Implementing air monitoring procedures as directed.
 - Implementing hazard communication, respiratory protection, and other associated safety and health programs.
- Compliance with the requirements stipulated in this HASP is monitored by the SHSO and coordinated through the TtNUS CLEAN HSM.

Note: In some cases one person may be designated responsibilities for more than one position. For example, at NAS Pensacola the FOL may also be responsible for the SHSO duties. This action will be performed only as credentials, experience, and availability permits.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Air Station Pensacola Address: Pensacola, Florida

Navy Engineer-In-Charge (EIC): William Hill Phone Number: (843) 820-7324

NAS Pensacola Environmental Coordinator: Greg Campbell Phone Number: (850) 452-4611 ext. 103

Purpose of Site Visit: This activity is divided into a multi-task operation (see Section 4.0), including monitoring well installation, multi media sampling, surveying, and IDW management.

Proposed Dates of Work: July 2004 until completion (See work plan for detailed schedule).

Project Team:

TtNUS Management Personnel:	Discipline/Tasks Assigned:	Phone #'s/E-mail
<u>Gerald Walker, P.G.</u>	<u>Task Order Manager (TOM)</u>	<u>(850) 385-9899</u> walkerg@ttnus.com
<u>Matthew M. Soltis, CIH, CSP</u>	<u>CLEAN Health and Safety Manager</u>	<u>(412) 921-8912</u> soltism@ttnus.com
<u>Howard Engle</u>	<u>Field Operations Leader (FOL)</u>	<u>(850) 385-9899</u> engleh@ttnus.com
<u>TBD</u>	<u>Site Health and Safety Officer (SHSO)</u>	<u></u>
<u>Thomas M. Dickson, CSP</u>	<u>Project Health and Safety Officer (PHSO)</u>	<u>(412) 921-8457</u> dicksont@ttnus.com
<u>Thomas Patton</u>	<u>Equipment Manager</u>	<u>(412) 859-4670</u> <u>Fax (412) 859-0521</u> patton@ttnus.com

Non-TtNUS Personnel Affiliation/Discipline/Tasks Assigned

Phone #'s

<u>TBD</u>	<u>Hollow Stem Auger Drilling Subcontractor</u>	<u></u>
<u>TBD</u>	<u>Direct Push Drilling Subcontractor</u>	<u></u>

Hazard Assessment (for purposes of 29 CFR 1910.132) for HASP preparation has been conducted by:

Prepared by: Thomas M. Dickson, CSP

TBD - To be determined

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section of the HASP is part of a preplanning effort to direct and guide field personnel in the event of an emergency. The first measure in accomplishing this objective is to define, what is and is not, an emergency.

An emergency as defined in 1910.120 is:

An occurrence or condition that can or has resulted in an uncontrolled release of a hazardous substance or potential safety hazard (i.e., fire, explosion, chemical exposure) associated with that release.

An incidental release as defined in 1910.120 is:

The releases of a hazardous substance that can be absorbed, neutralized, or otherwise controlled and will not result in potential safety hazard (i.e., fire, explosion, chemical exposure) are not considered emergency responses.

Based on the above definitions, TtNUS will provide through on-site resources and personnel initial incident response measures for incidents such as:

- Initial fire-fighting support and prevention
- Initial spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provision of initial medical support for injury/illness requiring only first-aid level support
- Provision of site control and security measures as necessary

Incidents and conditions above this level of participation are and will be considered emergencies. These events are considered beyond the capabilities of field personnel and above available resources to provide emergency response safely. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders in the event of an emergency. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time.

This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(I)(1)(ii).

The FOL and/or the SHSO are responsible for this plans implementation. Any and all questions should be directed to them or the PHSO for clarification.

2.2 PRE-EMERGENCY PLANNING – RECOGNITION AND PREVENTION

The primary focus of this section is the ability to recognize and control factors that could contribute to an incident/emergency situation/condition. Situations/conditions recognized that could lead to an incident/emergency situation include

Physical Hazards

- Drilling activities
 - Struck by – Movement in and around operating equipment
 - Entanglement into rotating equipment
 - Contact with overhead or underground energized sources

See Section 5.2 Monitoring Well Installation – Hollow Stem Auger, Section 4.0 of the HSGM, Table 5-1 Monitoring Well Installation, and Section 9.0 Site Control for identified control measures to minimize or eliminate these hazards.

Chemical Hazards

- Groundwater sampling
 - Groundwater contamination
 - Decontamination solvents

See Section 6.1 Chemical Hazards and Tables 5-1 Mobilization/Demobilization, Monitoring Well Installation, Multi-media sampling for identified control measures to minimize or eliminate these hazards.

Natural Hazards

- Mobilization/Demobilization
- Surveying
- Multi-media Sampling
 - Snakes/Snake bite
 - Alligators

See Section 6.3 Natural Hazards, Section 4.0 of the HSGM, and Tables 5-1 Mobilization/Demobilization, Monitoring Well Installation, Multi-media sampling, and surveying for identified control measures to minimize or eliminate these hazards.

2.2.1 General Practices – Pre-Emergency Planning

To further minimize and eliminate these potential emergency situations, emergency planning activities associated with this project, the following responsibilities are assigned to the FOL and/or the SHSO:

- The FOL and/or the SHSO will coordinate response actions with NAS Pensacola Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with facility emergency response procedures. This will serve as the initial review of the Emergency Action Plan.
- Establish and maintain information at the project staging area (Support Zone) for easy access in the event of an emergency. This information includes the following:
 - Chemical Inventory (for substances used on-site), with Material Safety Data Sheets.
 - On-site personnel medical records (medical data sheets).
 - A logbook identifying personnel on-site each day.
 - Emergency notification phone numbers and maps to the hospital will be maintained in site vehicles.

Note: It is the responsibility of the TtNUS FOL and/or the SHSO to ensure that this information is available and present at the site.

- **Identifying a chain of command for emergency action** – The FOL and/or the SHSO will serve as Incident Commander in the event of an on-site incident. He or she will remain in this position unless the incident progresses to an emergency situation. Once emergency response crews arrive, he or she will relinquish command to the responding agency.
- **Educating site workers** - Educating site workers to the potential emergency situations that may exist and the associated control measures will be critical in early recognition and prevention. This will be accomplished through
 - Site specific training
 - Use and application of the Safe Work Permit System (See Section 10.2)
 - Daily Tool Box Meetings
 - Previewing work areas to identify, barricade, or remove physical hazards where identified.
- **Survey Work Areas before committing personnel and resources** - Identify, remove, and/or barricade physical hazards within the estimated work area.
 - Ensure that approach paths to monitoring wells are maintained (cleared, mowed, etc.)

- Inspect monitoring well protective casings are cleared of spider and insect nests.
- Inspect remote sample locations for signs of natural hazards (i.e., heavy brush – ticks; snakes, etc.)
- **Provide the necessary emergency action equipment** to control potential emergencies (i.e., safety cans for flammable liquid storage, spill containment equipment, PPE, and emergency equipment such as portable fire extinguishers). It will be the responsibility of the SHSO to determine how many first aid kits, fire extinguishers, etc. are required based on the number of remote and/or separated concurrent operations are being conducted.
- **Evaluate/Survey operations** to ensure that necessary measures are taken to control and/or minimize the impact of emergency situations/conditions. This includes actions such as, but not limited to, securing the necessary permits and clearances such as Utility and Excavation Clearances provided by the Base and Sunshine State One Call of Florida, Inc.; Ensuring equipment and resources are at the ready for response to incidental measures; Personnel are adequately trained in the provisions of this HASP and this Emergency Action Plan. The information derived from these periodic evaluations will provide some of the content for the daily tool box meetings. The Daily Tool Box meeting will provide the forum for discussion and resolution to these findings.

Field Crew shall:

- Identify, remove, or barricade physical hazards within the estimated work area identified by the FOL and/or the SHSO.
- Follow the guidelines for control of emergency conditions.
- Report any potential emergency situation to the FOL and/or the SHSO.

2.3 SAFE DISTANCES AND PLACES OF REFUGE/EMERGENCY ALERTING

In the event of an incident, personnel will engage identified resources necessary to prevent the condition/situation from becoming an emergency. In the event these initial response measures cannot control the incident personnel will undertake the following measures:

- Evacuate non-essential personnel to identified safe places of refuge and secure the immediate area.
- The FOL and/or the SHSO will notify emergency services
 - Give the emergency operator the location of the emergency and a brief description of what has occurred.
 - Stay on the phone and follow the instructions given by the operator.
 - The appropriate agency will be notified and dispatched.

- Field personnel will provide perimeter security of the work area until emergency services arrive.
- Once emergency services arrive TtNUS and subcontractor personnel will report to the designated safe place of refuge.

2.3.1 Critical Operations

There are no operations being conducted under this scope of work that are considered critical and would require an individual or individuals to man during an emergency. Therefore in the event of an emergency all personnel will cease all operations and report to the safe place of refuge.

2.4 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During an evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. However, it is unlikely that an emergency would occur which would require workers to evacuate the site without first performing decontamination procedures. Decontamination of medical emergencies will proceed in the following manner.

2.4.1 Non-Life Threatening Medical Incident (Bruises, Cuts, Scrapes, Etc.)

The area of clothing or suit penetration will be isolated from the decontamination procedure by removing the protective garments or clothing surrounding the area of the injury and applying a light gauze wrap and plastic cover. Decontamination for unaffected areas will proceed as per Table 5-1 of this HASP.

2.4.2 Life Threatening

- Engage Emergency Notification Sequence
- Notify off-site response agencies.
- If it will not endanger the injured individual (i.e., spinal cord injury, etc.) remove any outer PPE. Removal may require the use of bandage scissors to remove the outer garments.
- Begin life saving techniques as appropriate (CPR, cooling or warming regimens, etc.).
- Cover the injured in a blanket to prevent the onset of shock.
- Follow instructions provided in Attachment I.

Note: One person from the field team will accompany the injured to the hospital with his/her medical data sheet, appropriate MSDSs (if applicable), a copy of this HASP, and the incident forms. This person will collect as much information as possible, and transfer that information to the HSM and WorkCare as per the Incident Response Protocol provided in Figure 2-1. All other personnel will engage site control/site security measures.

The SHSO upon insuring care for the injured party will engage an investigation of the incident to gather as much information as possible. This includes as a minimum answering the questions Who? What? Where? When? Why? and How?. This information will then be communicated to the PM and the HSM. Attachment I Tetra Tech NUS, Inc. Injury/Illness Procedure will be used to accomplish this task.

2.4.3 Emergency Medical Treatment

Tetra Tech NUS and subcontractor personnel are only permitted to provide treatment to the level of their First-Aid Training. It should also be noted all first aid shall be administered voluntarily. In all cases, make sure a member of the field crew notifies the emergency services and that they are enroute.

All First-Aid provided will incorporate the following protective measures:

Emergency medical treatment will be initiated under the following guarded restrictions:

- Take the necessary precautions to prevent direct contact with the injured person's body fluids. This may be accomplished through the employment of the following measures:
 - Use surgeons gloves when handling cuts, abrasions, bites, punctures, etc. or any part of the injured person. The use of safety glasses and surgeons masks is recommended, if there is the potential for uncontrolled spread of body fluids. The PHSO will be immediately notified in event that personnel providing emergency first-aid and/or come into contact with body fluids or other potentially infectious tissues.
 - Should Cardio-Pulmonary Resuscitation (CPR) be required, use a CPR Micro-Shield mouthpiece when administering CPR to prevent contact with the injured person's body fluids.

In order to engage these protective measures the FOL shall insure that these items are part of their first-aid kit.

2.5 EMERGENCY CONTACTS

Prior to performing work at the site, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an incident. A mobile/cellular phone shall be available on site. It will be the responsibility of the FOL and/or the SHSO to test or otherwise insure that the signal strength is sufficient to contact emergency services. If it is not then a different provider, two way radio, or other supported means of communication will be utilized. Table 2-1 provides a list of emergency contacts and their corresponding telephone numbers. This table must be posted on site where it is readily available to all site personnel or provided to site personnel.

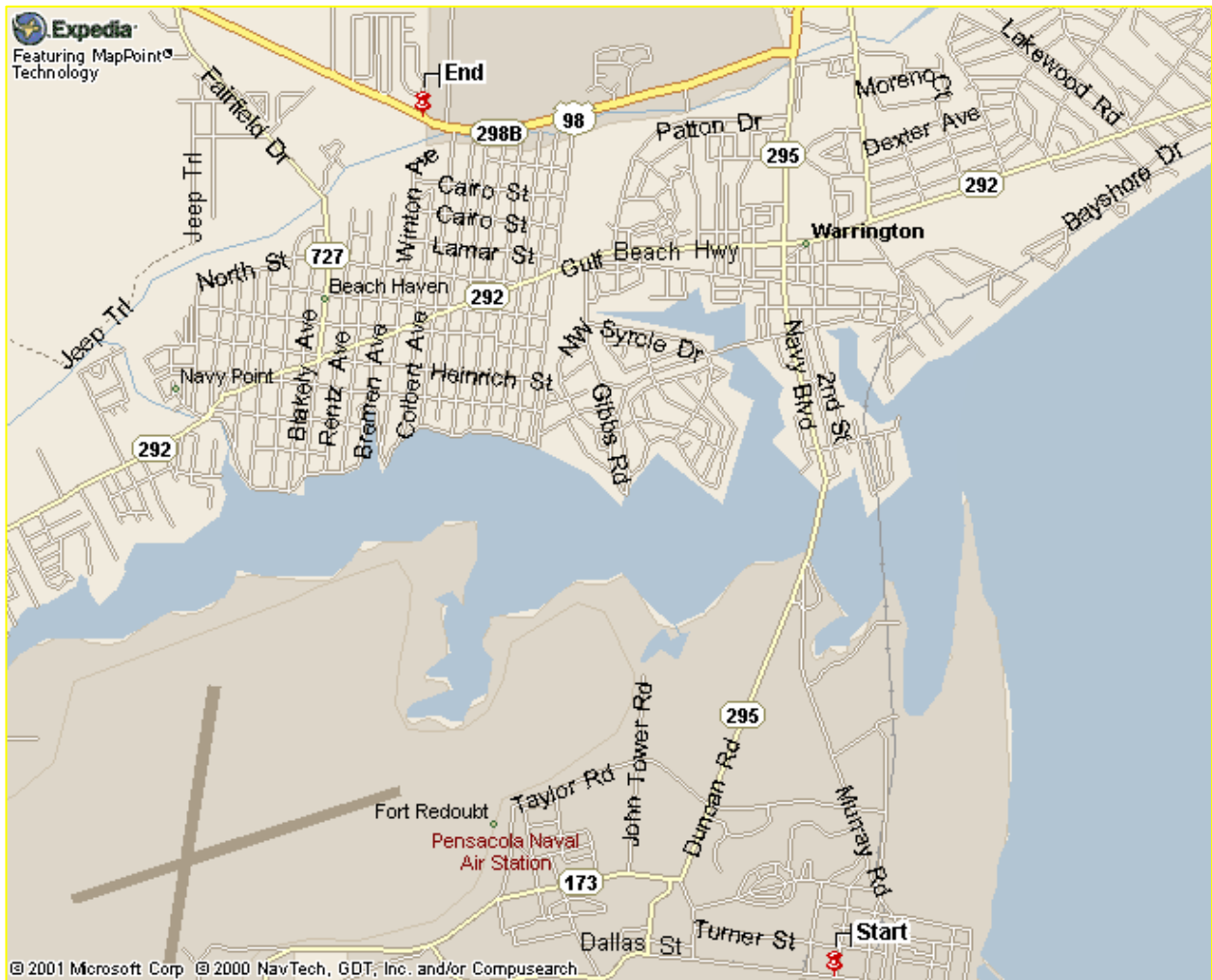
**TABLE 2-1
EMERGENCY CONTACTS
NAS PENSACOLA**

AGENCY	TELEPHONE
EMERGENCY (outside services) (Police, Fire, and Ambulance Services)	911
NAS Pensacola – Emergency Dispatch	(850) 452-3333
Navy Engineer-in-Charge William Hill	(843) 820-7324
Facility Point of Contact Greg Campbell	(850) 452-4611 ext 103
Navy Hospital	(850) 505-6600
Baptist Hospital	(850) 469-2313
Poison Control Center	(800) 222-1222
Florida Game and Fresh Water Fish Commission Northwest Region Office	(850) 265-3676
WorkCare	(800) 229-3674
TtNUS Tallahassee Office and Task Order Manager (Gerry Walker)	(850) 385-9899
CLEAN Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Thomas M. Dickson, CSP	(412) 921-8457

2.6 ROUTE TO HOSPITALS

Two hospitals could potentially be used during this project depending on the circumstances and degree of the emergency. For emergency situations the Naval Hospital Pensacola (NHP) should be utilized. The hospital is closer to the site and is fully prepared to accept trauma cases as well as potentially chemically contaminated patients. Baptist Hospital will be used for all non-emergency care services. Routes and directions to these hospitals are provided in Figures 2-1 and 2-2, respectively.

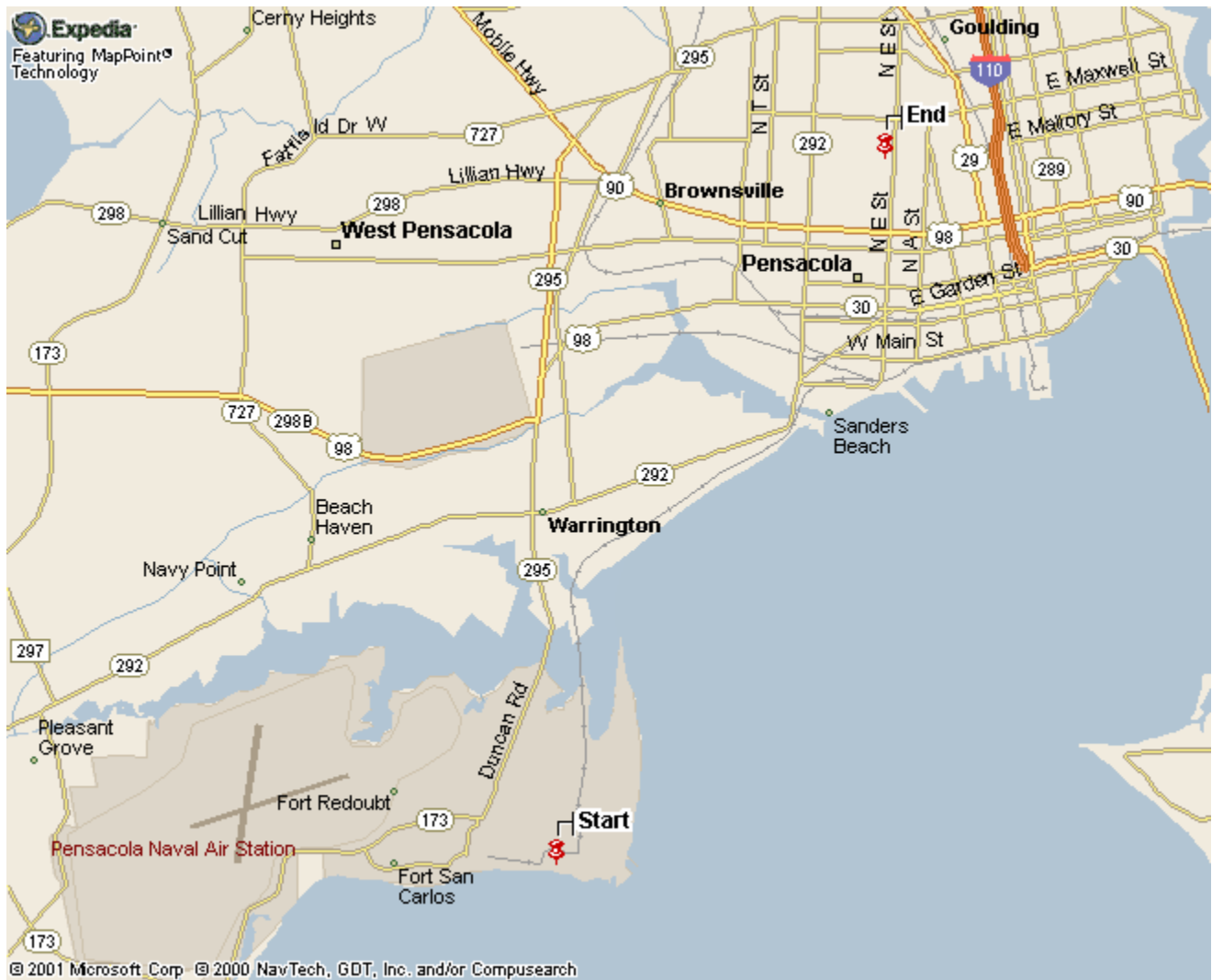
FIGURE 2-1
Navy Hospital Pensacola
6000 W. Highway 98
Pensacola, Florida 32512
(850) 505-6600



- ➊ Proceed out of Main Gate (Navy Blvd/Rt. 295) heading north towards US Highway 98.
- ➋ Turn left (heading west) on US 98 and proceed approximately 1 mile.
- ➌ Hospital will be on the right (Building 2268).

FIGURE 2-2

Route to Baptist Hospital
1000 West Moreno Blvd.
Pensacola, FL 32508
(850-469-2313)



Directions to this Hospital from the Main Gate of NAS Pensacola are:

- ❶ Proceed out of Main Gate (Navy Blvd/Rt. 295) heading north to Hwy 292.
- ❷ Turn right (heading east) on Hwy 292 until it turns into Garden Street (approx. 3 miles).
- ❸ Take Garden Street to intersection with "E" Street.
- ❹ Turn left onto "E" Street and proceed approximately 1 mile to Hospital on left.

2.6 INJURY/ILLNESS REPORTING

In addition, TtNUS personnel who are injured or become ill on the job must notify appropriate company representatives. Figure 2-3 and Attachment I presents the procedure for reporting an injury/illness, and the form to use for this purpose.

FIGURE 2-3 EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations.

In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification and be prepared to provide:
 - Any known information about the nature of the injury.
 - As much of the exposure history as was feasible to determine in the time allowed.
 - Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
 - Name and phone number of an informed site officer who will be responsible for further investigations.
 - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Manager Marilyn Duffy at 1-800-245-2730.
- As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of the data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this

generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

FIGURE 2-3 (continued)
WORKCARE
POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was their skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Nausea / Vomiting

Dizziness

Weakness

Delayed Symptoms:

Weakness

Nausea / Vomiting

Shortness of Breath

Cough

Loss of Appetite

Abdominal Pain

Headache

Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Cyanosis

Nausea / Vomiting

Dizziness

Weakness

Loss of Appetite

Abdominal Pain

Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicating: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 SITE DESCRIPTION

NAS Pensacola is located in Escambia County in the panhandle of Northwest Florida. The installation occupies 8,423 acres of land - 5,800 acres at the main installation (NAS), and 2,623 acres at other area locations including Corry Station, Saufley Field and Outlying Landing Field Bronson.

3.2 SITE 43

Site 43 is located at the southwest corner of Murray and Taylor Roads, and currently consists of an area approximately 200 feet by 200 feet in size. The site is planted with grass and contains a tennis court, an old building foundation, and access roads to the officers' quarters.

In December 1992, a child playing with a metal detector discovered two partially buried drums exposed at the surface just east of the tennis court. One drum was reported to be in a vertical position; its end punctured revealing standing water in the interior. The second drum was observed to be intact in a vertical position. A third iron object resembling a drum rim was observed between the fenced area and the tennis court.

EnSafe/Allen & Hoshall conducted a geophysical investigation in March 1994 using gradient and total magnetic surveys to provide the locations of potential buried metal objects, including drums, relatively quickly. The objectives of the investigation were to determine the extent of the drum disposal area.

Results of the geophysical investigation identified metal anomalies consistent with metal drums in an area approximately 100-feet by 120-feet as a possible drum disposal area. A large section of land in the north half of the surveyed area was interpreted as free of drums. Although cultural clutter (buried utilities, metal fences, poles, buildings, etc.) precluded a definitive interpretation. The magnetic anomaly data indicated the disposal area did not contain systematic disposal areas, rather the anomalies were limited in number and randomly dispersed. The actual number of drums disposed in the area could not be determined.

Results from the Site Characterization Investigation indicate that surface soil, subsurface soil to a depth of 3.5 feet, and groundwater at Site 43 have been impacted by the historical use of the site as a drum storage area. Four of the six metals detected in groundwater at concentrations above the FDEP criteria were also found in soils at concentrations exceeding residential DELs. While the inorganic concentrations may reflect turbidity of the water samples, it is likely that inorganic soil contamination has impacted groundwater at the site.

Site Characterization Report Addendum

During the completion of the Site Characterization Investigation, 14 buried drums were excavated onsite and placed in over pack containers for offsite disposal. The contents of the drums were not sampled for laboratory analysis during the investigation, therefore an additional drum characterization sampling event was completed and documented as a Site Characterization Report Addendum (TtNUS 2001). The results of the Site Characterization Report Addendum indicated that 12 of the 14 drums contained insufficient volume/mass to be sample. The two remaining drums were sampled and contained metals and PAHs at concentrations exceeding Florida Soil Cleanup Target Levels. Following the assessment activities the drums were properly disposed as non-hazardous waste.

Interim Removal Action

Following the completion of the Site Characterization Investigation and addendum, an Interim Removal Action was completed CH2MHILL Constructors, Inc. to remove the metal debris and contaminated surface and subsurface soils at the site. The interim removal action is summarized in the "Interim Removal Action Report Excavation of Contaminated Soil and Groundwater Monitoring at Site 43 Naval Air Station Pensacola, Pensacola, Florida".

IRA Conclusions:

- An IRA was completed to remove visible debris and the upper 2 feet of contaminated soil.
- Thirty-one truck loads with an accumulated total of 747.62 tons of soil and debris were transported to Michigan Disposal Waste Treatment Facility in Bellevue, Michigan.
- Fourteen drums from the initial site investigation, 20 to 25 drums, and drum parts were loaded and disposed of in the Michigan landfill.
- Ornamental ordnance and munitions were found in the excavation area and were determined to be inert and disposed of in the Michigan landfill.
- Following the IRA, RGs were revisited and it was determined that the initial RGs were not appropriate for the site. Based upon this information, laboratory data were reevaluated to characterize the extent of contamination at the site.
- Due to the change in RGs following the IRA activities, several inorganics and two SVOCs remain in surface and subsurface soil at concentrations above their respective RG.
- Iron concentrations detected in groundwater during the IRA sampling activities were all below the background concentration for iron at NAS Pensacola.

4.0 SCOPE OF WORK

This section discusses the specific tasks that are to be conducted as part of this scope of work as identified by CTO 0355. These tasks are the only ones addressed by this HASP. Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The TOM or a designated representative will submit the requested modifications to this document to the HSM.

Specific tasks to be conducted include the following:

- Mobilization/demobilization activities
- Soil borings via Direct Push Technology (DPT)
 - Approximately 25 soil borings will be conducted at Site 43. The soil borings are estimated to be up to approximately 15-feet in depth. Samples will be collected at the surface, estimated 5-feet below the ground surface, and a vadose zone sample will be collected and analyzed from each boring
- Monitoring well installation using HSA - Abandon 5 temporary monitoring wells and replace with 5 new monitoring wells. In addition, eight shallow wells (25-feet) and 2 deep monitoring wells (50-feet) will be installed using HSA.
- Groundwater sampling using low flow purging and sampling techniques and peristaltic pumps. In addition, aquifer testing (slug testing) will be conducted at 3 selected wells.
- Decontamination
- Geographic Surveying
 - Top of casing of each permanent well
 - Horizontal location of each well and DPT location
 - All locations will be referenced to site features (building corners, etc.)
- IDW Management
 - It is estimated that 1 roll off box (for soils) will be generated and approximately 20 drums of purge/development/decontamination water.

For more detailed description of the associated tasks, refer to the Work Plan (WP).

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES

Table 5-1 of this section is intended to assist project personnel in the recognition of hazards and recommended control measures necessary for each planned task to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which personal protective equipment (PPE) and decontamination procedures are to be used as well as appropriate air monitoring techniques and action levels. This table must be updated if the scope of work, contaminants of concern, or pertinent conditions change.

Safe Work Permits will be issued for all site activities (See Section 10.2). The FOL and/or the SHSO will use the elements defined in Table 5-1 as the primary reference for completing the Safe Work Permit adding additional information as warranted.

The following text provides a general description of the tasks to be conducted and are the basis for the hazard assessment.

5.1 MOBILIZATION/DEMOBILIZATION

This task includes, but not limited to, the following

- The procurement and shipping of equipment, and materials for the field investigation.
- Review of planning documents (i.e., HASP, Sampling and Analysis Plan, Work Plan, Quality Assurance Plan, etc.)
- Site Reconnaissance to include site characterization, site preparation, the layout of drilling/sampling locations, securing the necessary utility clearances and isolating physical hazards, where applicable.
- Secure, construct, or equip decontamination facilities to support the field activities.
- Secure, construct, or equip IDW storage facilities to support the field activities.

Physical Hazards – The hazard types associated with this task are considered primarily to be Physical hazards – Lifting, strains/sprains, lacerations achieved during unpacking of equipment and during site preparation (i.e., cutting open boxes, lifting equipment, locating sample points).

Chemical Hazards - It is not anticipated that personnel will be exposed to chemical hazards during this task. The FOL and/or the SHSO must establish the site-specific Hazard Communication Program to address potential chemical hazards of chemicals brought on-site. See Section 5.0 of the HSGM.

5.2 MONITORING WELL INSTALLATION – HOLLOW STEM AUGER

Five temporary wells are to be abandoned and replaced with new permanent wells at Site 43. In addition, 8 shallow wells and 2 deep wells will be installed as part of this field effort using Hollow Stem Auger techniques. This method of drilling consists of advancing hollow rotating augers into the ground. Cuttings are brought to the surface by the rotating action of the auger. Advantages of this type of drilling include:

- Samples can be obtained while augers remain in the ground. Subsurface soil sampling requires the use of split-barrel or thin-wall tube samplers advanced through the hollow core of the auger.
- No drilling fluids are required.
- A well can be installed inside the auger stem and back-filled as the augers are withdrawn.

Physical Hazards – Physical hazards includes

- Entanglement within rotating equipment (augers); caught between pinches and compressions. These hazards are not only the most serious (entanglement) but also pinches/compressions are the most frequent type of injury the drilling industry. Due to a recent fatality (within the last two years) that occurred when a worker wearing a hooded sweatshirt became entangled in rotating augers, several safe work practices have been incorporated into this activity. These include
 - All emergency stop devices will be tested initially and periodically thereafter. This will be accomplished during the equipment inspection and at random intervals.
 - One person on the drill crew will be designated as the Emergency Stop Device Operator.
 - Prior to the initiation of augers, the driller will announce they are about to start and will insure all personnel are away from rotating apparatus.
 - The SHSO shall insure that all personnel have
 - Secured/removed all loose clothing articles – The fatality listed above as well as a previous fatality were as a result of hooded sweatshirts snagging the rotating augers.
 - Removed all jewelry that could snag
- Energized Systems – Overhead and underground. The utility locating and clearance procedure will serve as the primary mechanism to prevent this hazard. NAS Pensacola will arrange for the utility clearance. Tetra Tech NUS personnel will complete applicable sections within Attachment II Utility Locating and Excavation Clearance SOP as a redundant check mechanism.
- Lifting – auger flights (>100 lbs) bags of Portland Cement (>90 lbs). Again this is a very common occurrence within the drilling industry.

- Pressurized systems – This hazard is compounded due to the workers close proximity to pressurized hydraulic lines and systems on the drill rigs. In addition, pressurized hazards exist as it pertains to the decontamination process. In addition, the potential for burns or water lacerations exists during the decontamination process of auger flights and drill equipment when using pressurized and/or steam cleaners. There was an incident that occurred within the last two years in which a pressurized line broke free and struck a worker also resulting in a near fatality. Therefore, extra efforts will be employed to ensure that fittings and connections are secure, appropriate, and compatible. Those fittings and connections near the operator or drillers helper that are not guarded will be secured by whatever means are necessary (i.e., pressurized line restraints).
- Traffic hazards – This site is located on the corner of Murray and Taylor Roads. This area also occupies access roads to the Officers Quarters and a tennis court. Both foot and vehicular traffic hazards are considered prevalent during certain phases of executing this scope of work. Diligent measures are required constructing and isolating work zones to control traffic away from the work zones.
- Noise – The operating level of a standard hollow stem auger drill rig varies between 86 and 89 dBA presenting potential noise exposure concerns. This potential hazard is also a concern during the decontamination process using pressure washer/steam cleaners. These items typically operate at 94-97 dBA when engaged.

Chemical Hazards – Potential occupational chemical exposure during this activity would be anticipated under the following conditions.

- Contaminant exposure based on direct interaction with contaminated media. See Sections 6.1 Chemical Hazards, Table 6-1, and 7.0 Hazard Monitoring for potential health effect information and exposure potential.
- Exposure to chemicals associated with well construction materials are also a concern. This includes sand, grout and cement (both containing Portland Cement), and Bentonite. Hazards associated with these chemicals include irritation of the eyes, alkali/chromium burns of contact points associated with wet cement, and respiratory irritation.

The Drilling Subcontractor shall provide applicable MSDSs. The SHSO shall incorporate these documents into the Site specific Hazard Communication Program (See Section 5.0 HSGM). The SHSO will add these compound to the chemical inventory list, discuss control measures in employee training, insure proper container labeling, and MSDS use.

5.2.1 Surface/Subsurface Soil Sampling/Temporary Monitoring Well Installation – DPT

Common physical hazards associated with DPT activities include the following:

- Pinch/compression Points – The potential exists during the soil boring using MacroCore Samplers to get fingers caught within pinch points during the hydraulic driving as well as between wrenches and hard surfaces when opening the samplers.
- Pressurized systems – This hazard is compounded due to the workers close proximity to pressurized hydraulic lines and systems on the DPT rigs. In addition, pressurized hazards exist as it pertains to the decontamination process. Those fittings and connections near the operator or drillers helper that are not guarded will be secured by whatever means are necessary (i.e., pressurized line restraints).
- Noise – The operating level of a standard DPT rig varies between 89 and 92 dBA presenting potential noise exposure concerns. During hammering the impact levels may reach higher levels.
- Cuts, pricks, and lacerations – This hazard is possible when cutting the acetate liners. To combat this hazard the Geoprobe Sampling Kit or similar equipment is required. This mechanism secures the acetate liner while cutting. In addition when transporting glassware for sample collection or testing may present a problem should the glassware become broken. To combat this hazard hard sided containers such as coolers will be used to transport glassware. This will prevent possible breakage as well as protect the individual from the glass shards should the glass become broken.

Chemical Hazards – Potential occupational chemical exposure during this activity would be anticipated under the following conditions.

- Contaminant exposure based on direct interaction with contaminated media. See Table 6-1 for potential health effect information for known or suspected site contaminants.

5.3 AQUIFER DEVELOPMENT/TESTING/SAMPLING

5.3.1 Monitoring Well Development

The development of the monitoring wells are intended to remove debris associated with installation and condition the sand pack to facilitate contact with the surrounding aquifer. Monitoring well development is typically accomplished using surge blocks and pumps to force water in and out of the sand pack and formation. The debris dislodged through this action is typically removed using a 1" inch Whale Pumps

with 12-volt battery will be employed to remove specified water volumes as well as any debris. The wells to be developed include the 15 newly installed.

See Section 5.3.4 for potential hazards.

5.3.2 Permanent/Temporary Monitoring Well Sampling

The monitoring wells will be sampled using low-flow purging and sampling techniques. Peristaltic pumps will be used to purge and to collect groundwater samples. Field measurements of pH, temperature, specific conductance, and turbidity will be made during purging using a direct reading instrument. These measurements will be taken at the start of purging and every 5 to 15 minutes until the parameters have stabilized. The wells will be purged until a sufficient predetermined amount of water has been removed and the water quality measurements are acceptable and stable. All tubing used for sampling will be dedicated and disposed of after the sample has been collected.

See Section 5.3.4 for potential hazards.

5.3.3 Water Level Measurements

Water level measurements will be taken at the existing and newly installed temporary monitoring wells during this field investigation. The water levels will be taken with an electric water level indicator using the top of the well casing as the reference point for determining water depths. Water levels will be conducted upon completion of the newly installed wells and prior to and through the course of purging and sampling.

See Section 5.3.4 for potential hazards.

5.3.4 Hydraulic Conductivity Testing

Hydraulic characteristics of the groundwater will be tested to determine the ability of the porous material surrounding the well to transmit water. This information will be employed to evaluate flow patterns as well as contaminant migration to construct a model for the area of investigation. Currently, it is planned that three selected wells will be slug tested.

Slug testing is comprised of rising and falling tests. A pressure transducer is placed in the well, and a slug (of known volume) is either introduced (falling head test) into the water column or extracted (rising head test) from the water column. The pressure transducer measures the changes in water level over an increment of time.

Physical Hazards – The hazard types associated with the above tasks are similar in nature and therefore presented together. Physical hazards as it pertains to development, sampling, hydraulic conductivity testing

–

- Lifting, strains/sprains, associated with handling purge/development waters.
- Cuts, pricks, and lacerations – This hazard is possible when cutting tubing or when transporting glassware for sample collection or testing may present a problem should the glassware become broken
- Traffic hazards – These sites are located within very active industrial areas. Some of the investigation locations are along travel thoroughfares and within active areas of the facility. Both foot and vehicular traffic hazards are considered prevalent during certain phases of executing this scope of work.
- Electrical hazards – Remote but possible when handling and using a 12-volt battery as a power source for the Whale pumps (used in development) or for the peristaltic pumps.

Chemical Hazards - Chemical exposure during this activity maybe facilitated through

- Direct contact - Splash - Contaminant exposure based on direct interaction with contaminated media through possible splash.
- Inhalation – Some wells possibly due to site contaminants or due to the build up biological degradation off-gases. When a field crew member opens the well, he or she may be exposed to vapors/gases coming out of the well and may also encounter excess pressure build up in the well head. To control exposure limit the proximity of the technician to the well head (stand up wind) as well as the amount of time he or she remains there.
- Ingestion – Due to handling of equipment, sample media, and improper work hygiene could result in the ingestion of identified site contaminants. The primary contaminants of concern are in the particulate form. Therefore, inhalation of airborne dusts and ingestion are the primary routes of exposure.
- Sample preservatives/decontamination solutions – Certain chemicals will be brought on-site in support of this field investigation effort. These chemical hazard classes include corrosives, flammable, and oxidizers.

See Section 6.1 for potential health effect information due to chemical exposure. See also the Site Specific Hazard Communication Program for controlling hazards as it pertains to chemical substances brought on-site.

5.4 GEOGRAPHICAL SURVEYING

This activity is generally non-intrusive in nature. Vertical elevations and horizontal locations will be taken from the ground surface at well and soil sampling locations.

Physical Hazards associated with this task includes

- Traffic hazards – This site is located within very active area. Some of the investigation locations are along travel thoroughfares and within or near the recreational area. Both foot and vehicular traffic hazards are considered prevalent during certain phases of executing this scope of work.
- Trips and Falls – This hazard is considered due to uneven ground (curb sides, hill sides) and potentially slippery surfaces.

Natural Hazards – This hazard is not considered prevalent during as this activity as the locations are within active and maintained area.

5.5 DECONTAMINATION

The equipment involved in the field activities for well installation and sampling will be decontaminated prior to during, and after the completion of on-site activities.

5.5.1 Heavy Equipment

Heavy equipment decontamination will be accomplished using a pressure washer and/or steam cleaner within an established temporary decontamination pad.

Procedural steps are as follows

1. Remove gross (visible) materials using scrapers, shovels as necessary (soils, etc.)
2. Use the pressure washer/steam cleaner remove remaining visible debris.
3. As necessary, follow up with scrub brushes with Alconox or Liquinox detergent wash.
4. Potable water rinse using pressure washer/steam cleaner as necessary
5. Solvent rinse (Isopropanol) – This application will only pertain to the sample collecting media (split spoon, reusable trowels and hand augers, See 5.6.2).

6. DI water rinse
7. Air dry

5.5.2 **Sampling Equipment**

All non-dedicated sampling equipment (i.e. stainless-steel hand augers, trowels, bowls) will be decontaminated prior to the initiation of field sampling, between sample locations, and at the completion of the field activities. The following decontamination steps will be taken.

1. Remove heavy materials (soils, etc.)
2. Alconox or Liquinox detergent wash
3. Potable water rinse
4. Solvent rinse (Isopropanol)
5. DI water rinse
6. Air dry

All dedicated sampling and PPE equipment will be rinse to remove gross contamination and then disposed.

Physical Hazards associated with this activity include:

- Water cuts/lacerations/burns – This is the primary and most severe hazard associated with this activity. Incidents have occurred where persons have placed the pressure wand on their boot and accidentally compressed the trigger resulting in burns and water lacerations.
- Noise – Operating level of the pressure washer/steam cleaners typically operate at 94-97 dBA when engaged.

Chemical Hazards associated with this activity include:

- Exposure to contaminated media
- Exposure to decontamination solvents

5.6 INVESTIGATIVE DERIVED WASTE MANAGEMENT

This task includes the containerization, labeling, staging, monitoring, and final deposition of investigative derived wastes. These are as follows:

Containerization – Materials generated including soils, purge and development waters, decontamination fluids shall be collected, containerized (soils in a roll-off box, purge/development and decontamination waters in 55-gallon drums) and staged in a centralized location identified by NAS Pensacola.

Labeling – All containers will be labeled as to their contents. The labels will include the following information:

Site

Job Number

Location (SWMU)

Date – To be completed once filling the container begins

Drum # - Assign an inventory number to be added to a comprehensive log

Contents – Description

Volume – Final volume

Contact – This person should be available on base. To this end an up-dated inventory should be provided at the close of each shift to this person.

Emergency Number – Contact person provided above

Staging – All drums will be staged on pallets (4 to a pallet) with lid retention ring bolt accessible on the outside as well as the label. Pallet rows will maintain a minimum of 4 feet between rows for access and monitoring for leaks. Containers will be separated according to media and site.

Monitoring – During staging site personnel will examine containers to ensure they are not leaking.

Final Deposition – Waste materials will be separated as determined through sampling and disposed of through pre-determined routes.

Physical Hazards associated with this Waste Management activity include:

- Caught between pinches and compressions. This occurs primarily when moving containers to transport vehicles and when staging the drums on pallets. The prevalent hazard is recognized when moving the drums and hands get caught between drums.

- Lifting – Drums of water can weigh upwards of 475 lbs.

For more detailed description of the associated tasks, refer to the Work Plan (WP) and/or the Quality Assurance Plan (QAP).

5.7 GENERAL SAFE WORK PRACTICES

In addition to the task-specific safe work practices identified in Table 5-1 to be employed to minimize task specific hazards, the following general safe work practices will be observed. These safe work practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Refrain from eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. This is especially critical between breaks and prior to lunch and associated hand to mouth activities.
- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Do not place monitoring equipment on potentially contaminated surfaces.
- Be familiar with and adhere to all instructions provided within this site-specific HASP.
- Be aware of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.
- Use the “buddy system”.
- Maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

- Establish appropriate Safety Zones including Support, Contamination Reduction, and Exclusion Zones.
- Minimize the number of personnel and equipment in contaminated areas (such as the Exclusion Zone). Non-essential vehicles and equipment should remain within the Support Zone.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Health and Safety Officer (SHSO).
- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone. Smoking will only be permitted in specified areas at Site 4.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.8 DRILLING (HSA/DPT) SAFE WORK PRACTICES

The following Safe Work Practices are to be followed when working in or around the HSA Drill Rig Operations.

5.8.1 Before Drilling

- Identify all underground utilities and buried structures before drilling. This service is provided by the NAS Pensacola and Sunshine State One Call of Florida. In addition, Tetra Tech NUS, Inc. personnel will use the Utility Locating and Excavation Clearance Standard Operating Procedure provided in Attachment II.
 - 1) A request is submitted to Sunshine State One Call of Florida (1-800-432-4770) for clearance of a location(s). Often times intersections, building numbers, or other location identifiers are provided. It is best to provide as much assistance as possible. Ensure that marks are on the ground using white paint or flagging. Sunshine State One Call of Florida then notifies members within this cooperative. This is sometimes where problems arise. Not all utilities are required to be members. Provisions to accommodate this shortfall are provided in the Tetra Tech NUS, Inc. Utility Locating and Excavation Clearance Standard Operating Procedure provided in Attachment II.

- 2) Typical timeline for marking and providing clearances is 48-hrs. A ticket or ticket number will be provided referring to your clearance. This will have a timeline, generally 14-days. Again problems sometime arise here because site personnel allow their tickets to expire, then accidentally encounter a utility. Tickets must be maintained valid by asking for a re-issue or extension, when necessary, prior to expiration.
 - 3) Another problem that occurs with time is that utility locations marked on the ground may not remain visible. The FOL is responsible for ensuring that utility locations/marks on the ground are maintained so they remain visible (repaint, pin flags, etc.), and to annotate maps with these locations so they may be incorporated into the GIS system.
 - 4) Lastly, once marks are placed on the ground and have been cleared, only limited leeway (2-feet) exists to stray from the planned and approved intrusive locations.
- All drill rigs will be inspected by the SHSO or designee, prior to the acceptance of the equipment at the site and prior to the use of the equipment. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist for Drill Rigs provided in Attachment III. Additional inspections will be performed at least once every 10-day shift or following repairs.
 - Check operation of the Kill Switch (initially, then periodically thereafter). See section 5.2 concerning these testing of the emergency stop devices and the other required precautions.
 - Insure all machine guarding is in place and properly adjusted.
 - Block drill rig and use levelers to prevent movement of the drill.
 - The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding operating equipment.
 - The driller's helper will establish an equipment staging and laydown plan. The purpose of this is to keep the work area clear of clutter and slips, trips, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse of stacked equipment.
 - All potentially contaminated tooling will be wrapped in polyethylene sheeting for storage and transport to the centrally located equipment decontamination unit.

5.8.2 During Drilling

- Minimize contact to the extent possible with contaminated tooling and environmental media.

- Support functions (sampling and screening stations) will be maintained a minimum distance from the drill rig of the height of the mast plus five feet or 35-feet for HSA, 25-feet for DPT operations whichever is greater to remove these activities from within physical hazard boundaries. These boundaries because they are in areas where the general population exists will be strictly enforced by site personnel.
- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the drill rig.
- During maintenance, use only manufacturer provided/approved equipment (i.e. auger flight connectors, etc.)
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move auger flights and other heavy tooling.
- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted at all times.

5.8.3 After Drilling

- All equipment used within the exclusion zone will undergo a complete decontamination and evaluation by the SHSO to determine cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.
- All motorized equipment will be fueled prior to the commencement of the days activities. During fueling operations all equipment will be shutdown and bonded to the fuel source.
- When not in use all drill rigs will be shutdown, and emergency brakes set and wheels will be chocked to prevent movement.
- All areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.

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TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES NAS PENSACOLA, PENSACOLA, FLORIDA

Task/Operation/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Types and Action Levels	Personal Protective Equipment (Items in italics are deemed optional as conditions or the FOL or SHSO dictate.)	Decontamination Procedures
<p>Mobilization/ Demobilization</p> <p>This activity includes, but not limited to:</p> <ul style="list-style-type: none">- Equipment Preparation and Inspection- Resource acquisition and unpacking of supplies- Site clearance and preparation – Utility clearances, etc.- Establish and construct access routes to sample/work locations, where applicable.- Construct decontamination and IDW operation and storage facilities, as applicable.	<p>Chemical hazards:</p> <p>1) Exposure to identified site contaminants are not anticipated. However, potential exposure to chemicals brought on-site should be considered.</p> <p>Physical hazards:</p> <p>2) Lifting (strain/muscle pulls) 3) Cuts and lacerations 4) Pinches and compressions/Struck by 5) Slips, trips, and falls 6) Heavy equipment hazards (swinging booms, hydraulic lines, etc.) 7) Vehicular and foot traffic</p> <p>Natural hazards:</p> <p>8) Ambient temperature extremes (heat/cold stress) 9) Insect and animal bites 10) Inclement weather</p>	<p>Chemical hazards: 1) The on-site Hazard Communication Program (Section 5.0 TiNUS Health and Safety Guidance Manual) will be followed. All chemicals brought onto the site by Tetra Tech NUS and subcontractor personnel will be inventoried with each applicable chemical having an MSDS on site, on file. This effort shall include</p> <ul style="list-style-type: none">• Accurate Chemical Inventory List (Entries will match chemicals brought on-site, as the names appear on the MSDS and the label) This list shall also include quantities and storage locations will be maintained in a centralized location and made available upon request.• MSDS's will be maintained in a central location, accessible to all personnel.• All containers will have labels specifying the following information:<ul style="list-style-type: none">- Chemical Identity (As it appears on the label, MSDS, and Chemical Inventory List)- Appropriate Warning (i.e., Eye and skin irritation, flammable, etc.)- Manufacturer's Name Address and Phone Number <p>All personnel will be required to review the appropriate MSDS's if they are not familiar with the hazards of the chemicals to be used, prior to the use of a specified chemical substance. Information on hazards and PPE will be communicated on the Safe Work Permit for this task. Any specific provisions recommended by the MSDS shall be in place (i.e., eye wash, fire extinguisher, specified PPE, etc.) prior to using the chemical substance.</p> <p>Physical hazards: 2) Lifting Hazards – During mobilization/demobilization personnel are required to handle equipment, supplies, and resources in preparation for site activities. This hazard becomes more predominant in the early morning hours (prior to muscles becoming limber) and later in the day (as a result of fatigue). The following provisions shall be instituted in order to minimize hazards of this nature:</p> <ul style="list-style-type: none">• Use machinery or multiple personnel for heavy lifts, where possible.• Use proper lifting techniques<ul style="list-style-type: none">- Lift with your legs, not your back, bend your knees move as close to the load as possible, and ensure good hand holds are obtainable.- Minimize the horizontal distance to the center of the lift to your center of gravity.- Minimize turning and twisting when lifting as the lower back is especially vulnerable at this time.- Break lifts into steps if the vertical distance (from the start point to the placement of the lift) is excessive.- Plan your lifts – Place heavy items on shelves between the waist and chest; lighter items on higher shelves.- Periods of high frequency lifts or extended duration lifts should provide sufficient breaks to guard against fatigue and injury. <p>Other considerations associated with lifting injuries and muscle strains include</p> <ul style="list-style-type: none">• Area available to maneuver the lift.• Area of the lift – Work place clutter, slippery surfaces• Your Overall physical condition <p>3) Cuts and lacerations – To prevent cuts and lacerations associated with unpacking or packing equipment and supplies, during site preparation (clearing access routes), the following provisions are required:</p> <ul style="list-style-type: none">- Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.- Do not place items to be cut in your hand or on your knee.- Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting instruments. <p>If hand tools (brush hooks, machetes, etc.) are used to gain access to sample locations, the following precautions are recommended:</p> <ul style="list-style-type: none">- Ensure handles are of good construction (no cracks, splinters, loose heads/cutting apparatus.- Ensure all cutting tools are maintained. Blades shall be sharp without nicks and gouges in the blade.- All hand tools (brush hooks, machetes, etc.) with cutting blades shall be provided with a sheath to protect individuals when not in use and when carrying these items over rough or slippery terrain.- All personnel will maintain a 10-foot perimeter or greater around persons clearing brush and access paths to sample and/or well locations. <p>4) Pinches/Compressions/Struck By - Do not modify tooling without manufacturer's expressed permission.</p> <ul style="list-style-type: none">- Keep any machine guarding in place, avoid moving parts.- Use tools or equipment where necessary to avoid placing hands in areas vulnerable to pinch points.- Adjust machine guarding as necessary to minimize access into the machine.- When staging equipment, insure all stacked loads, shelving, are adequately secure to avoid creating a hazard from falling objects. <p>5) Preview work locations for unstable/uneven terrain.</p> <ul style="list-style-type: none">- Cover, guard and barricade all open pits, ditches, and floor opening as necessary.- Ruts, roots, tools, and other tripping hazards should be eliminated to minimize trips and falls.- Maintain a clutter free work area.- As part of site control efforts construct fences or other means of demarcation (i.e. signs and postings) to control and isolate traffic in the work area. Means of demarcation shall also be constructed isolating resource and/or staging areas. <p>6) Heavy Equipment Hazards - All equipment will be</p> <ul style="list-style-type: none">- Inspected in accordance with OSHA and manufacturer's design.- All equipment inspection will be documented on a Equipment Inspection Checklist as provided in (See Attachment III).- Operated by knowledgeable operators and ground crew. <p>7) Vehicular and Foot Traffic Hazards - As part of site preparation activities and zone construction, when preparing traffic and equipment considerations are to include the following:</p> <ul style="list-style-type: none">- Establish safe zones of approach (i.e. Boom or mast + 5 feet). See Table 5-1 for Soil boring/Monitoring Well Installation for recommended distances.- The mast will be lowered when moving the rig.- Foot and vehicular traffic routes shall be well defined.- Heavy equipment patterns shall be isolated using fences or other suitable barricades from pedestrian pathways.- Bumpers or other suitable traffic stops shall be placed in areas where it is desired that traffic approaching an drop offs or unprotected banks.- All self-propelled equipment with restricted vision moving backwards shall be equipped with back up warning systems.- The FOL and/or the SHSO as a precautionary measure to remove or demarcate physical hazards shall preview traffic routes (foot and vehicular) before the commitment of personnel and resources. <p>Natural hazards: 8) Ambient Temperature Extremes - Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat and cold stress is provided in Section 4.0 of the TiNUS Health and Safety Guidance Manual. 9) Insect/Animal Bites and Stings - This is not considered a predominant hazard as these activities are to be conducted in a well maintained area on the corner of Murray and Taylor Roads. To combat the potential impact of natural hazards, the following actions are recommended</p> <p>Insects and spiders</p> <ul style="list-style-type: none">- Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control.- Tape pant legs to work boots to block direct access. This is especially critical when clearing or entering heavy brush and wooded areas.- Do not stick your hand anywhere where you can't see.- Use repellents – Permanone should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. Products containing DEET may be applied directly to the skin. As always follow manufacturer's recommendations for use.- If you leave your workboots at the trailer or office over your break make sure you shake them out before sticking your feet in them. <p>10) Inclement Weather - Suspend or terminate operations until directed otherwise by SHSO. See Section 4.0 of the TiNUS Health and Safety Guidance Manual for additional information concerning natural hazards.</p>	<p>Visual observation of work practices by the FOL and/or the SHSO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.).</p> <p>Monitoring for chemical hazards are not required during this activity.</p>	<p>Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - <i>Snake chaps(for remote and unmaintained areas)</i> - <i>Safety glasses (for moving through brush and when involved in activities that could result in flying projectiles such as hammering or chopping and clearing brush)</i> - <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i> - <i>Reflective vest for high traffic areas</i> - <i>Hearing protection for high noise areas (At the direction of the FOL and/or the SHSO).</i></p> <p>As site conditions may change, the following equipment will be maintained during all on-site activities as prescribed in Section 2.0 of this HASP</p> <ul style="list-style-type: none">- Fire Extinguishers- First-aid kit <p>Note: <i>The FOL and/or the SHSO will determine the number of fire extinguishers and first-aid kits to be made available based on the number of operations to be conducted at any given time.</i></p>	<p>Not required.</p> <p>Good personal hygiene practices should be employed prior to breaks lunch or other period when hand to mouth contact occurs. This will minimize potential ingestion exposures.</p> <p>Personnel should inspect themselves and one another for the presence of ticks when exiting wooded areas, grassy fields, etc. This action will be employed to assist in stopping the transfer of these insects into vehicles, homes, and offices.</p> <p>In a review of a number of tick bites reported over the past few years, the ticks that went undetected were located on the back and in the shoulder areas. Have your buddy examine this area carefully.</p>

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<p>Monitoring Well Installation using Hollow Stem Augers</p> <p>Five temporary wells will be abandoned and replaced with permanent wells. In addition, eight shallow wells (25-feet) and two deep wells (50-feet) will be installed.</p> <p>Soil Borings – using DPT</p> <p>Approximately 25 soil borings are planned at Site 43. Samples will be collected on the surface, 5-feet bgs, and within the vadose zone.</p>	<p>Chemical hazards:</p> <p>1) Previous analytical data identified the following compound as the primary contaminant of concern</p> <p>Lead 20700 mg/m³</p> <p>PAHs/other metals were identified within the subsurface soils. These compounds were not in sufficient concentrations to present and exposure threat through inhalation.</p> <p>Further information on these contaminants are presented in Section 6.1, and Table 6-1.</p> <p>2) Transfer of contamination into clean areas or onto persons</p> <p>Physical hazards:</p> <p>3) Heavy equipment hazards (pinch/compressions points, rotating equipment, hydraulic lines, etc.)</p> <p>4) Noise in excess of 85 dBA</p> <p>5) Energized systems (contact with underground or overhead utilities)</p> <p>6) Lifting (strain/muscle pulls)</p> <p>7) Slips, trips, and falls</p> <p>8) Cuts and lacerations</p> <p>9) Vehicular and foot traffic Further information on these physical hazards, see Section 6.2 for further discussions.</p> <p>Natural hazards:</p> <p>10) Inclement weather</p> <p>11) Insect bites</p>	<p>Chemical hazards:</p> <p>1) Particulates - As a general rule, avoiding contact with contaminated media (air, water, soils, etc.) through proper use and application of PPE. As the materials in question are solids and/or bound to particulates, dust/particulate suppression will be the next control measure employed to minimize potential exposure. In addition, good work and personal hygiene measures will be employed to control exposure through ingestion. Avoid hand to mouth contact to the extent possible wash hands and face or use hygienic wipes to remove potential contaminants from hands and face prior to breaks or lunch or other hand to mouth activities. It should be noted that exposure during DPT/HSA in an open air environment is not anticipated. During the execution of these two activities limited surface area is being disturbed thereby minimizing the potential to mechanically agitate a sufficient amount of material to become airborne. This minimizes potential exposure. In addition, as these activities are conducted outside where general wind patterns may knock down and disperse airborne dust.</p> <p>2) Transfer of Contamination into Clean Areas or onto Persons - Restrict the cross use of equipment and supplies between locations and activities without first going through a suitable decontamination. Work practices including establishing a rigid decontamination procedure will be employed for all equipment between locations and between clean and potentially dirty work. This provision along with dedicated sampling equipment will insure materials are not carried and deposited in unaffected areas.</p> <p>Physical hazards:</p> <p>3) Heavy Equipment Hazards - All equipment will be:</p> <ul style="list-style-type: none">- Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600.601.602), and manufacturer's design, as applicable. All inspections will be documented using the Equipment Inspection Checklist (for Drill Rigs) found in (See Attachment III) of this HASP.- Operated and supported by knowledgeable operators and ground crew.- Used within safe work zones, with routes of approach clearly demarcated. All personnel not directly supporting this operation will remain at least 35-feet for HSA Rigs/25 feet for DPT rigs from the point of operation or the height of the mast plus 5-feet, whichever is greater. See Section 10.1.1 of this HASP. This will be the area identified as the exclusion zone.- All self-propelled equipment with restricted field of vision moving backwards shall be equipped with a Back up alarm.- All personnel will be instructed in the location and operations of the emergency shut-off device(s). This device will be tested initially (and then daily) to ensure its operational status.- One person (usually the driller) will be designated as the Emergency Shut Off Device Operator.- Prior to engaging the augers, the driller will announce, loud enough for all to hear that he is engaging the augers. He will visually confirm that all personnel are removed from the rotating equipment then engage the augers.- Areas will be inspected prior to the movement of the direct push rig and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SHSO.- See additional safe work procedures for drilling in Section 5.9 of this HASP as well as in Section 4.0 of the HSGM. <p>4) Noise in Excess of 85 dBA - Hearing protection will be used during all subsurface activities using the HSA Drill Rig and direct push rig or when noise levels are >85 dBA. (during operation). Previous accumulated data indicates an average 8 hour exposure working behind a direct push rig during hydraulic and hammer advancement of the tooling is approximately 87-92 dBA.. Noise levels generated by HSA averages 86-89dBA.. Controlling this hazard shall be accomplished employing two separate approaches as follows:</p> <ul style="list-style-type: none">- Site control boundaries will be established to limit the affect of the noise hazard (See Item 3, 3rd bullet).- Hearing protection – As a general rule of thumb <p><i>Excessive noise levels (>85dBA) are being approached when you have to raise your voice to talk to someone within 2 feet of your location.</i></p> <p>5) Energized Systems - All drilling activities will proceed in accordance with the Utility Locating and Excavation Clearance SOP in Attachment II of this HASP. All utility clearances will be obtained in writing, and locations identified and marked, prior to activities. If it is not obtainable/unknown or you location infringes within 3-feet of an underground utility advancement must proceed by hand until past the utility. The hand dug hole must at least represent the same diameter of the mechanized tooling that will be used. Utility clearance is being provided by NAS Pensacola.</p> <p>6) Lifting Hazards - Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques as described in Table 5-1 for mobilization/demobilization. Drill stems, auger flights, and well construction supplies are some of the common material that are handled and because of their weight will present a lifting strain hazard associated with this activity.</p> <p>7) Slips, Trips, and Falls - Preview work locations for unstable/uneven terrain.</p> <ul style="list-style-type: none">- Cover, guard and barricade all open pits, ditches, and floor opening as necessary.- Ruts, roots, tools, and other tripping hazards should be eliminated/demarcated to minimize trips and falls.- Maintain a clutter free work area.- As part of site control efforts construct fences or other means of demarcation (i.e. signs and postings) to control and isolate traffic in the work area. Means of demarcation shall also be constructed isolating resource and/or staging areas. <p>8) Cuts and Lacerations - To prevent cuts and lacerations, the following provisions are required:</p> <ul style="list-style-type: none">- Obtain and use the knife and acetate tube retention tub recommended by Geoprobe (Geoprobe Sampling Kit) to prevent potential cuts and lacerations when accessing samples within MacroCore acetate liners. These items have been engineered to allow sample acquisition without putting the sampler at risk.- Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.- Do not place items to be cut in your hand or on your knee.- Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments.- Wear cut-resistant gloves (leather or heavy cotton) <p>9) Vehicular and Foot Traffic Hazards - Use traffic-warning signs, flag persons, and high visibility vests as determined by the SHSO when work infringes traffic thoroughfares. In addition, use physical barricades, when working within or altering normal traffic flow patterns/traffic lanes.</p> <p>Natural hazards:</p> <p>10) Inclement Weather – To minimize hazards of this nature, the following provisions shall be employed:</p> <ul style="list-style-type: none">- Wear appropriate clothing for weather conditions.- Provide acceptable shelter and replacement liquids for field crews as relief from excessive ambient temperatures.- Under conditions of elevated levels of PPE, periods of acclimatization, excessive ambient temperature extremes, or if you believe someone is suffering from a heat/cold related disorder, it may be necessary to conduct heat/cold stress monitoring.- Electrical storms/high winds - Suspend or terminate operations until directed otherwise by SHSO. <p>Follow the provisions as specified in Section 4.0 of the Tetra Tech NUS, Inc. Health and Safety Guidance Manual regarding the identification and evaluation of heat/cold stress related conditions.</p> <p>11) Insect bites/Snakes/Alligators. These hazards are not anticipated to be as predominant within this area as it is an active area that is regularly maintained.</p>	<p>1) Monitoring shall be conducted to qualify and quantify estimated source concentrations of on-site contaminants in support of the prescribed worker protection levels. Monitoring shall be conducted using</p> <p>Particulate Meter</p> <p><1.0 mg/m3 continue to work, continue to monitor</p> <p>>1.0 mg/m3 use area wetting to control airborne dust emissions.</p> <p>Sustained airborne concentrations above the identified action levels will result in ceasing the operation until airborne concentrations recede to background concentrations.</p> <p>Failure of these concentrations to diminish will require an upgrade in the level of protection and therefore a modification of this HASP. Contact the PHSO.</p> <p>Monitoring shall be conducted at the prescribed depths as indicated on the boring logs at the source (borehole) and drillers breathing zone. Monitoring shall also be conducted at the sampler's location to in the same prescribed frequency when handling samples.</p> <p>Noise monitoring maybe conducted at the discretion of the PHSO and/or the SHSO.</p> <p>Action Level - >85 dBA Participation in the Project Hearing Conservation Program. Hearing protection is required for this operation.</p>	<p>All soil boring operations and monitoring well installation will be initiated in Level D protection, including the following articles:</p> <p>Sampler/Oversight Personnel</p> <ul style="list-style-type: none">- Standard field dress (long pants, Sleeved shirts)- Steel toe safety shoes or work boots- Hard hat(when within 35-feet of the drill rig)- Safety Glasses(when within 35-feet of the drill rig or when sampling)- Nitrile surgeon style inner gloves for sampling- Hearing protection(when within 35-feet of an operating HSA drill rig; 25-feet of an operating DPT rig)- <i>Impermeable boot covers</i>- <i>Reflective vest for traffic areas</i> <p>Driller and Driller Helper</p> <ul style="list-style-type: none">- Standard field attire including sleeved shirt and long pants- Safety shoes (Steel toe/shank)- Safety glasses- Nitrile inner and outer gloves or supported neoprene- Hearing protection- Hard hat- <i>Impermeable aprons are recommended for handling contaminated auger flights and drill stems against the body. The apron will prevent soiling and saturation of work clothes</i>- <i>Impermeable boot covers</i> <p>Upgrades to Level C and B protection are not anticipated.</p> <p>Note: Use of respiratory protection will require the implementation of the Tetra Tech NUS, Inc. Respiratory Protection Program provided in the Health and safety Guidance Manual.</p> <p>As site conditions may change, the following equipment will be maintained during all on-site activities</p> <ul style="list-style-type: none">- Fire Extinguishers- First-aid Kit <p>Note: The Safe Work Permit(s) for this task (See Attachment IV of this HASP) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, impermeable apron, as applicable</p> <p>Gross contamination of outer boots and outer gloves will be removed at a satellite location near the operation. Final wash and rinse will take place at the centralized decontamination pad. The sequential procedure is as follows:</p> <p>Stage 1: Equipment drop</p> <p>Decontamination personnel will clean hand tools as necessary.</p> <p>Stage 2: Soap/water wash and rinse of outer boots as applicable and gloves</p> <p>Stage 3: Soap/water wash and rinse of the impermeable apron, as applicable.</p> <p>Stage 4: Disposable PPE will be removed and bagged.</p> <p>Stage 5: Wash face and hands</p> <p>Note: For remote locations away from the centralized decontamination unit</p> <ul style="list-style-type: none">- Bag and/or wrap all disposable and reusable equipment, respectively for transport back to the decontamination unit.- Hygienic wipes may be used for cleaning hands and face <p>Equipment Decontamination - All heavy and sampling equipment decontamination will take place at a centralized decontamination pad utilizing a steam cleaner or pressure washer as prescribed in Table 5-1 for that task. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will have restricted access to exclusion zones. Vehicles will have their wheels/tires cleaned or sprayed off as applicable as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</p> <p>The FOL or the SHSO will be responsible for evaluating equipment arriving on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.</p>

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<p>Multi-media sampling, including</p> <ul style="list-style-type: none">- Monitoring Well Development using whale pumps and surge blocks- Hydraulic Conductivity testing using slugs- Groundwater Sampling – Peristaltic pumps- Surface and Subsurface soils – MacroCore samplers, disposable trowels. This activity will primarily be addressed under soil boring and monitoring well installation. <p>Hazards are anticipated to be similar in all of these activities.</p>	<p>Chemical hazards:</p> <p>1) Previous analytical data identified the following compound as the primary contaminant of concern</p> <p>Lead 20700 mg/m³</p> <p>PAHs/other metals were identified within the subsurface soils. These compounds were not in sufficient concentrations to present and exposure threat through inhalation.</p> <p>Further information on these contaminants are presented in Section 6.1, and Table 6-1.</p> <p>Chemical reagents and sample preservatives provided by the analytical laboratory.</p> <p>2) Transfer of contamination into clean areas.</p> <p>Physical hazards:</p> <p>3) Slip, trip, and fall hazards</p> <p>4) Strain/muscle pulls from manual lifting</p> <p>5) Cuts and Lacerations</p> <p>6) Ambient temperature extremes (heat/cold stress)</p> <p>7) Site Characterization</p> <p>8) Water Hazards - Drowning</p> <p>Natural hazards:</p> <p>9) Animal and insect bites and encounters</p> <p>10) Inclement weather</p>	<p>Chemical hazards:</p> <p>1) Particulates - As a general rule, avoiding contact with contaminated media (air, water, soils, etc.) through proper use and application of PPE. As the materials in question are solids and/or bound to particulates, dust/particulate suppression will be the next control measure employed to minimize potential exposure. In addition, good work and personal hygiene measures will be employed to control exposure through ingestion. Avoid hand to mouth contact to the extent possible wash hands and face or use hygienic wipes to remove potential contaminants from hands and face prior to breaks or lunch or other hand to mouth activities. It should be noted that exposure during DPT/HSA in an open air environment is not anticipated. During the execution of these two activities limited surface area is being disturbed thereby minimizing the potential to mechanically agitate a sufficient amount of material to become airborne. This minimizes potential exposure. In addition, as these activities are conducted outside where general wind patterns may knock down and disperse airborne dust.</p> <p>When sampling groundwater wells exposure potential is the greatest when opening a well that has been sealed and that gases have built up inside. The following practice should be employed</p> <ul style="list-style-type: none">- At arms length, open the well and step away. Let the well off gas for a few minutes, while you prepare your equipment. Airborne concentrations will recede and you can continue with your task. <p>2) Transfer of Contamination into Clean Areas - Decontaminate all equipment and supplies between sampling locations and prior to leaving the site. See decontamination of heavy and sampling equipment for direction regarding this task. In addition, the bulk of sampling equipment such as tubing, trowels are disposable therefore dedicated. This will aid in preventing cross contamination.</p> <p>3) Slip, Trip, and Fall Hazards – These hazards shall be minimized by adherence to the practices listed below. This includes</p> <ul style="list-style-type: none">- Maintain proper housekeeping in all work areas.- Preview and inspect work areas to identify and eliminate slip, trip, or fall hazards.- Cover, guard, barricade, and or place warning postings over/at holes or openings that personnel may fall or step into.- For traversing steep, slippery, or sloped terrain establish rope ladders to control ascent and descent to sampling areas or use alternative pathways.- Use lifeline to sample along waters edge- Use multiple persons and pack small loads to remote locations. <p>4) Strain/Muscle Pulls from Manual Lifting - Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques (See Lifting Mobilization/Demobilization, Page 1 of 6, Table 5-1).</p> <p>5) Cuts and Lacerations – Employ the following measures to reduce and/or eliminate the potential for cuts and lacerations</p> <ul style="list-style-type: none">- Select and secure the most favorable route to monitoring wells and sampling locations.- Previewing pathways - Where possible, remove or demarcate the physical hazards.- Inspect all cutting equipment to be used to clear access routes for defects.- When cutting items - always use a sharp knife and always cut away from your body. Do not place items to be cut in your opposite hand or on your knee.- Carry all glassware and items that present a potential for cuts, lacerations, or impalement such as machetes or brush hooks in protective packaging or sheathed to avoid breakage or exposure in the event of a slip, trip, and/or fall. <p>6) Ambient Temperature Extremes (Heat/Cold Stress) - Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat/cold stress is provided in Section 4.0 of the Health and Safety Guidance Manual. Care should be exercised when working outdoors due to harmful effects of the sun. To reduce the potential for sunburn and melanoma the following measures should be employed</p> <ul style="list-style-type: none">- Wear a hat that shades the face, neck, and ears.- Apply sunscreen with a SPF of 15 or higher liberally on any exposed skin at least 15 minutes before going outside, then at least every two hours, more if you are sweating a lot.- Plan/provide suitable equipment to offer shade to avoid the midday sun since the sun's ultraviolet rays are most intense between 10 A.M. and 4 P.M. and can damage your skin even on hazy days.- Wear wrap-around sunglasses to protect the eyes and delicate skin around them. <p>7) Site Characterization - Work areas will be surveyed prior to committing personnel or resources. The survey will be conducted by the FOL and/or the SHSO. The purpose is to identify physical and natural hazards that may impact the proposed work area. These hazards are to be identified, barricaded, or eliminated to the extent possible to minimize potential effect to field crew.</p> <p>8) Insect/Animal Bites and Stings - This is not considered a predominant hazard as these activities are to be conducted in well maintained areas. To combat the potential impact of natural hazards, the following actions are recommended</p> <p>Insects and spiders</p> <ul style="list-style-type: none">- Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control.- Tape pant legs to work boots to block direct access. This is especially critical when clearing or entering heavy brush and wooded areas.- Do not stick your hand anywhere where you can't see.- When opening existing well heads be cautious of bees and spiders as these are preferred nesting locations.- Use repellents – Permanone should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. Products containing DEET can be applied directly to the skin. As always, follow manufacturer's recommendations for use.- If you leave your workboots at the trailer or office over your break make sure you shake them out before sticking your feet in them. <p>See Section 4.0 of the HSGM for more information concerning these natural hazards.</p> <p>9) Suspend or terminate operations during electrical storms. Return to work when directed by the FOL and/or the SHSO.</p>	<p>1) Monitoring shall be conducted to qualify and quantify estimated source concentrations of on-site contaminants in support of the prescribed worker protection levels. Monitoring shall be conducted using Particulate Meter</p> <p><1.0 mg/m3 continue to work, continue to monitor</p> <p>>1.0 mg/m3 use area wetting to control airborne dust emissions.</p> <p>Sustained airborne concentrations above the identified action levels will result in ceasing the operation until airborne concentrations recede to background concentrations.</p> <p>Failure of these concentrations to diminish will require an upgrade in the level of protection and therefore a modification of this HASP. Contact the PHSO.</p> <p>Monitoring shall be conducted at the prescribed depths as indicated on the boring logs at the source (borehole) and drillers breathing zone. Monitoring shall also be conducted at the sampler's location to in the same prescribed frequency when handling samples.</p> <p>Noise monitoring maybe conducted at the discretion of the PHSO and/or the SHSO.</p> <p>Action Level - >85 dBA Participation in the Project Hearing Conservation Program. Hearing protection is required for this operation.</p>	<p>Level D protection will be utilized for the following sampling activities</p> <ul style="list-style-type: none">- Monitoring Well Development- Hydraulic Conductivity testing- Groundwater Sampling – Peristaltic pumps- Surface/Subsurface soils – MacroCore Samplers, disposable trowels. <p>Sampler/Oversight Personnel</p> <ul style="list-style-type: none">- Hard Hats- Standard field dress (long pants, Sleeved shirts)- Steel toe safety shoes or work boots- Safety Glasses- Nitrile surgeon style inner gloves for sampling- <i>Hearing protection</i> (when within 25-feet of an operating direct push rig or 35-feet of a HSA Rig)- <i>Impermeable boot covers</i>- <i>Reflective vest for traffic areas</i> <p>Protective Measures as specified for drilling and soil boring will be employed for all subsurface soil sampling at the drill rig.</p> <p>Upgrades to Level C and B protection are not anticipated.</p> <p>Note: Use of respiratory protection will require the implementation of the Tetra Tech NUS, Inc. Respiratory Protection Program provided in the Health and safety Guidance Manual. This action will require this HASP to be modified for this elevated level of protection.</p> <p>Note: The Safe Work Permit(s) for this task (See Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination</p> <p>Upon completion of the sampling</p> <ul style="list-style-type: none">- Dedicated trowels, tubing, PPE will be rinsed and bagged for disposal.- Handi-Wipes or similar product will be used to clean hands, prior to moving to the next location. <p>Equipment Decontamination</p> <p>Decontamination of equipment (sampling and hand tools) will proceed as indicated in Table 5-1 of this HASP and/or the Workplan.</p>

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES NAS PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment (Items in italics are deemed optional as conditions or the FOL or SHSO dictate.)	Decontamination Procedures
<p>Decontamination of Heavy Equipment using pressure washers or steam cleaners.</p> <p>Decontamination of sampling equipment using 5-gallon buckets/scrub brushes, etc..</p> <p>It is anticipated that this activity will take place at a temporary centralized location. Gross contamination will be removed to the extent possible at the site. Contaminated tooling then will be wrapped in polyethylene sheeting for transport to the centralized location for a full decontamination and evaluation.</p>	<p>Chemical hazards:</p> <p>1) Previous analytical data identified the following compounds as contaminants of concern</p> <p>It is however, not anticipated to be a exposure hazard during this activity</p> <p>2) Decontamination fluids - Liquinox (detergent); isopropanol (decontamination solvent)</p> <p>Physical hazards:</p> <p>3) Lifting (strain/muscle pulls)</p> <p>4) Noise in excess of 85 dBA</p> <p>5) Flying projectiles</p> <p>6) Falling hazards</p> <p>7) Slips, trips, and falls</p> <p>Natural hazards:</p> <p>8) Inclement weather</p>	<p>1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Control potential non-occupational exposures through good work hygiene practices (i.e., avoid hand to mouth contact; wash hands and face before breaks and lunch; minimize contact with contaminated media). Obtain and familiarize yourself with manufacturer's MSDS for any decontamination fluids used on-site. Solvents may only be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS or within this HASP. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication Program provided in Section 5.0 of the TtNUS Health and Safety Guidance Manual.</p> <p>3) Use multiple persons where necessary for lifting and handling heavy equipment for decontamination purposes.</p> <p>- Employ proper lifting techniques as described in Table 5-1, Mobilization/Demobilization.</p> <p>4) Wear hearing protection when operating the pressure washer and/or steam cleaner. Sound pressure levels measured during the operation of similar pieces of equipment indicate a range of 87 to 93 dBA.</p> <p>5) Use eye and face protective equipment when operating the pressure washer and/or steam cleaner, due to flying projectiles. All other personnel must be restricted from the area. In addition to minimize hazards (flying projectiles, water lacerations and burns) associated with this operation, the following controls will be implemented</p> <p>- A Fan Tip 25° or greater will be used on pressurized systems over 3,000 psi. This will reduce the possibility of water lacerations or punctures.</p> <p>- Do not point the wand at persons or place against any part of your body.</p> <p>- Thermostat control will be in place and operational to control the temperature levels of the water where applicable.</p> <p>- Visual evaluations of hoses and fittings for structural defects</p> <p>- Construct deflection screens as necessary to control overspray and to guard against dispersion of contaminants driven off by the spray.</p> <p>6) Insure wash and drying racks are of suitable construction to prevent heavier items such as auger flights and drill rods from falling and striking someone during the decontamination process.</p> <p>7) The decontamination pad should be constructed to contain wash waters generated during decontamination procedures. Temporary decontamination pads are usually 10-30 mil polyethylene or polyvinyl chloride tarp construction. Although these items when used as a liner offer containment, they also present a slipping hazard. When these temporary liners are employed, it is recommended that a light coating of sand be spread over the walking surface to provide traction.</p> <p>- In addition, adequate slope should be provided to the pad to permit drainage away from the object being cleaned. The collection point for wash waters should be of adequate distance that the decontamination workers do not have to walk through the wash waters while completing their tasks.</p> <p>- Hoses should be gathered when not in use to eliminate potential tripping hazards.</p> <p>8) Suspend or terminate operations until directed otherwise by SHSO.</p>	<p>Use visual observation and real-time monitoring instrumentation to ensure all equipment has been properly cleaned of contamination and dried.</p> <p>Monitoring instrumentation will be employed to determine If contaminants and all of the decontamination solvent (isopropanol) (where use is applicable) has been removed through the rinse process. Any positive indication/results greater than background require the article that has been decontaminated to be re-rinsed and scanned again. If necessary this process should be repeated until no measurable indication of contaminants and/or the decontamination solvent exists.</p>	<p>For Heavy Equipment</p> <p>This applies to pressure washing and/or steam cleaning operations and soap/water wash and rinse procedures.</p> <p>Level D Minimum requirements:</p> <ul style="list-style-type: none">- Hard hat with splash shield- Standard field attire (Long sleeve shirt; long pants)- Safety shoes (Steel toe/shank)- Chemical resistant boot covers- Nitrile outer gloves over nitrile inner gloves- Safety glasses underneath a splash shield- Hearing protection (plugs or muffs)- <i>Hooded PVC Rainsuits or PE or PVC coated Tyvek</i>. Impermeable aprons may be used instead of coveralls if they offer adequate protection against overspray and back splash. <p>For sampling equipment (trowels, split spoons,, etc.), the following PPE is required</p> <p>Note: Consult MSDS for additional PPE guidance. Otherwise, observe the following.</p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none">- Standard field attire (Long sleeve shirt; long pants)- Safety shoes (Steel toe/shank)- Nitrile outer gloves over nitrile inner gloves- Safety glasses- <i>Impermeable apron</i> <p>Note: The Safe Work Permit(s) for this task (See Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable).</p> <p>The sequential procedure is as follows:</p> <p>Stage 1: Equipment drop, remove outer protective wrapping; personnel will wash hand tools and pass hand equipment through as necessary.</p> <p>Stage 2: Soap/water wash and rinse of outer boots and gloves</p> <p>Stage 3: Soap/water wash and rinse of the outer splash suit or apron as applicable</p> <p>Stage 4: Disposable PPE will be removed and bagged.</p> <p>Stage 5: Wash face and hands</p> <p>Equipment Decontamination - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing a steam cleaner or pressure washer.</p> <ol style="list-style-type: none">1. Remove gross (visible) materials using scrapers, shovels as necessary (soils, etc.)2. Use the pressure washer/steam cleaner remove remaining visible debris.3. As necessary, follow up with scrub brushes with Alconox or Liquinox detergent wash.4. Potable water rinse using pressure washer/steam cleaner as necessary5. DI water rinse6. Air dry <p>Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area.</p> <p>Sampling Equipment Decontamination</p> <ol style="list-style-type: none">1. Remove heavy materials (soils, etc.)2. Alconox or Liquinox detergent wash3. Potable water rinse4. Solvent rinse (Isopropanol)5. DI water rinse6. Air dry <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site.</p> <p>The FOL or the SHSO will be responsible for evaluating equipment arriving on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.</p>

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES NAS PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type And Action Levels	Personal Protective Equipment (Items In Italics Are Deemed Optional As Conditions Or The FOL Or the SHSO Dictate.)	Decontamination Procedures
<p>Surveying – Geographical</p> <p>The locations identified to be surveyed are largely within improved and well maintained areas. Therefore, the necessity to cut clear lines from vertical and horizontal control monuments is not anticipated.</p>	<p>Chemical hazards:</p> <p>Significant exposure to site contaminants is not anticipated during this task.</p> <p>Physical hazards:</p> <p>1) Slips, trips, and falls - A review of accident/injury statistics associated with land surveying identify slips, trips, and falls as the number one injury, followed by cuts and lacerations, and animal/insect bites.</p> <p>2) Cuts and abrasions</p> <p>3) Traffic hazards</p> <p>Natural hazards:</p> <p>4) Inclement weather</p> <p>5) Insect/animal bites or stings, poisonous plants, etc.</p>	<p>Physical hazards:</p> <p>1) Mark/delineate/barricade trip hazards. Where shoes with rugged soles to provide adequate traction.</p> <p>2) If hand tools (brush hooks, machetes, etc.) are necessary to clear and carry lines and bench marks to the area of operation the following precautions are recommended:</p> <ul style="list-style-type: none">- Ensure handles are of good construction (no cracks, splinters, loose heads/cutting apparatus.- Ensure all cutting tools are maintained. Blades shall be sharp without nicks and gouges in the blade.- All hand tools (brush hooks, machetes, etc.) with cutting blades shall be provided with a sheath to protect individuals, when not in use.- All personnel will maintain a 10-foot perimeter around persons clearing brush. <p>Note: It is not anticipated that trees >2-inch girth will be required to be dropped as part of this operation or that significant amount of clearing will be required. Therefore the use of chainsaws and chippers is not anticipated.</p> <p>Note: Where possible it is recommended that heavy equipment (tractors and brush hogs or similar equipment) be used to clear grid lines and lines of site.</p> <p>3) Vehicular traffic hazards</p> <ul style="list-style-type: none">- Wear high visibility vests when working in traffic patterns.- Provide signage in areas where traffic patterns will be altered (Survey crew working; lane restriction, etc.). <p>Natural hazards:</p> <p>4) Electrical storms or high winds - Suspend or terminate operations until directed otherwise by SHSO.</p> <p>Harmful effects of the Sun - Care should be exercised when working outdoors due to harmful effects of the sun. To reduce the potential for sunburn and melanoma the following measures should be employed</p> <ul style="list-style-type: none">- Wear a hat that shades the face, neck, and ears.- Apply sunscreen with a SPF of 15 or higher liberally on any exposed skin at least 15 minutes before going outside, then at least every two hours, more if you are sweating a lot.- To the extent possible, plan/provide suitable equipment to offer shade to avoid the midday sun since the sun's ultraviolet rays are most intense between 10 A.M. and 4 P.M. and can damage your skin even on hazy days.- Wear wrap-around sunglasses to protect the eyes and delicate skin around them. <p>- 5) Insect/Animal Bites and Stings - This is not considered a predominant hazard as these activities are to be conducted in maintained areas.</p> <p>Insects and spiders</p> <ul style="list-style-type: none">- Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control.- Tape pant legs to work boots to block direct access. This is especially critical when clearing or entering heavy brush and wooded areas.- Use insect repellents – Permanone should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. Products containing DEET may be applied directly to the skin. As always, follow manufacturer's recommendations for use.- Upon exiting the high brush and wooded areas perform a close body inspection to remove any ticks or other insects that have attached to your clothing or skin.- Do not stick your hand anywhere where you can't see.- When opening existing well heads be cautious of bees and spiders as these are preferred nesting locations. <p>See Section 4.0 of the TiNUS Health and Safety Guidance Manual for additional information concerning natural hazards.</p>	<p>Air monitoring is not required given the unlikelihood that airborne contaminants will be present. The potential for exposure to site contaminants during this activity is considered minimal.</p>	<p>Surveying activities shall be performed in Level D protection</p> <p>Level D Protection consists of the following:</p> <ul style="list-style-type: none">- Standard field dress including sleeved shirt and long pants- Shoes rugged lug sole for traction- Work gloves shall be worn when clearing brush.- <i>Safety glasses, hard hats (if working near machinery, overhead hazards, or clearing brush)</i>- <i>Snake chaps for heavily wooded area where encounters are likely.</i>- <i>Tyvek coveralls may be worn to provide additional protection against poisonous plants and insects, particularly ticks.</i>- <i>Reflective or blaze orange vests should be worn when working along traffic thoroughfares.</i> <p>Note: The Safe Work Permit(s) for this task (See Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination - A structured decontamination is not required as the likelihood of encountering contaminated media is considered remote. However, survey parties should inspect themselves and one another for the presence of ticks when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices. In addition, early detection shall provide for early removal.</p>

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES NAS PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type And Action Levels	Personal Protective Equipment <i>(Items In Italics Are Deemed Optional As Conditions Or The FOL Or the SHSO Dictate.)</i>	Decontamination Procedures
<p>IDW Management and Handling</p> <p>This activity includes the following tasks:</p> <ul style="list-style-type: none">- Containerization- Labelling- Staging- Monitoring <p>of IDW generated in support of site activities.</p> <p>Soils will be loaded into a roll-off box; waters will be containerized in 55-gallon drums.</p> <p>Dedicated equipment including</p> <ul style="list-style-type: none">- PPE- Tubing- Disposable trowels, etc. <p>Will have any visible materials removed then rinsed with potable water prior to disposal as normal refuse.</p>	<p>Chemical hazards:</p> <p>The only anticipated chemical hazard associated with IDW management is the potential for a spill. In situations such as that the spill containment program identified in Section 9.0 of this HASP will be employed.</p> <p>Physical hazards:</p> <ol style="list-style-type: none">1) Strains and sprains2) Back injuries3) Compressions4) Loading bulk transport containers	<p>Chemical hazards:</p> <p>It is not anticipated that chemical hazards will be significant during this operation, as the IDW will be in sealed containers. It is anticipated that the IDW will represent a limited chemical hazard, if the container is breached. Control measures in this case will represent PPE and good work hygiene practices to control potential exposures during the implementation of the Spill Containment Program (See Section 9.0 of this HASP).</p> <p>Roll-off Box specifications – Prior to placing soils inside the box will be</p> <ul style="list-style-type: none">- Lined with plastic sheeting- The gate will be sealable to prevent lose of material or leaks during movement, transfer or disposal- Cover with a tarp when not in use (to prevent the collection of rainwater)- The box will be properly labeled just as any other container <p>55-Gallon Drums – Drums will be handled in the following manner</p> <ul style="list-style-type: none">- All drums will be closed and sealed when not in use- Drums will be properly labeled as indicated below- The outer shell will be wiped down as necessary <p>Temporary containers (water containers, buckets, etc.) will be</p> <ul style="list-style-type: none">- Properly labeled- When working at a well sampling, plastic or preferably a mortar tub will be used to provide secondary containment for incidental spills during sampling- A bucket of wash water will be readily available to rinse dedicated equipment prior to disposal. <p>Physical hazards:</p> <p>1 & 2) Strains and sprains (lifting hazards)/Back Injuries – The predominant hazard associated with this activity is the movement of full or partially full 55-gallong drums of water. To minimize hazards of this nature the following provisions shall be incorporated as applicable:</p> <ul style="list-style-type: none">- Use machinery (preferred method) or multiple personnel for heavy lifts- Use proper lifting techniques<ol style="list-style-type: none">a. Lift with your legs, not your back, bend your knees move as close to the load as possible, and ensure good hand holds are available.b. Minimize the horizontal distance to the center of the lift to your center of gravity.c. Minimize turning and twisting when lifting as the lower back is especially vulnerable at this time.d. Break lifts into steps if the vertical distance (from the start point to the placement of the lift) is excessive.e. Periods of high frequency lifts or extended duration lifts should provide sufficient breaks to guard against fatigue and injury. <p>In determining whether you can lift or move an item several factors must be considered, these are as follows:</p> <ul style="list-style-type: none">- Area available to maneuver the lift.- Area of the lift – Work place clutter, slippery surfaces, rough terrain- Overall physical condition <p>3) Compressions – Another hazard frequently associated with this task is the compression of hands and fingers when placing the containers on pallets. This typically occurs when rolling and lowering the container in its place. To combat this hazard, the following provision shall be employed:</p> <p>Material handling devices shall be used for moving drums within the satellite storage area. This includes drum dollies with pneumatic tires, drum grapplers, etc. to handle drums of IDW. These pieces of equipment are engineered to allow placement of these containers while keeping hands from pinch/compression points.</p> <p>Reminder: The drums you are attempting to move, lift and/or relocate may weigh on the average of</p> <ul style="list-style-type: none">- 55-Gallon container of purge or decontamination waters = 475 lbs. (including the container) <p>Satellite Storage Area – Emphasis has been placed on the physical surroundings and how they can influence the potential hazards associated with material handling aspects of this task. To further reduce material handling hazards, support spill containment and control, and sampling when necessary, the IDW storage area should be structured as follows:</p> <ul style="list-style-type: none">- Maximum 4-drums to a pallet with retaining ring bolt and label on the outside for easy access/reference.- Maintain a minimum of 4-feet between each row of pallets. This is the minimum distance necessary to wheel drums on a drum dolly- If the site is not secured, the satellite storage area shall be fenced and signs placed indicating the following:<ol style="list-style-type: none">a. Primary Point of Contact (Preferably someone at the Base, and make sure they know they been identified as the Primary Point of Contact).b. Phone Numberc. Emergency Contact (If different from the Primary)- Provide a Drum/Container Inventory to the Primary Point of Contact and to Emergency Services, if they deem it necessary. The inventory should contain:<ol style="list-style-type: none">a. Each drum shall be assigned a unique identification number. This number shall be placed on the label and drum shell using a paint marker (Note: Do not paint the number on the lid as these have a tendency to get exchanged from time to time.)b. Types of waste materials (Subsurface soils, drill cuttings; purge/development waters, etc.)c. Volumes (Full or level associated with the container after completion of the project location)d. Where it was derived from (IDW should be separated by SWMU and media)e. Dates (For all filled containers and at the completion of work for that area or SWMU)f. Contact – For more information <p>Note: All drums should be labeled with the same information.</p>	<p>None Required, unless spill containment provisions are invoked. Then monitoring will proceed as described in the activity associated with the task when the materials were generated such as Soil boring or well installation.</p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none">- Standard field attire (Sleeved shirt; long pants)- Safety shoes (Steel toe/shank)- Leather or canvas work gloves- <i>Safety glasses (When utilizing cables or slings to move the containers)</i>- <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i> <p>PPE changes may be made with the implementation of the Spill Containment Program. This represents the only anticipated modification to this level of protection.</p>	<p>Not required, unless the implementation of the Spill Containment Program is required due to a spill and/or release. At that point the decontamination procedures for those activities such as soil borings and/or well installation. The reference reflects the tasks conducted when the materials were generated.</p>

6.0 HAZARD ASSESSMENT

This section provides information regarding the chemical, physical, and natural hazards associated with the sites to be investigated and the activities that are to be conducted as part of the scope of work. Table 6-1 provides information on potential chemical contaminants, including exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with NAS Pensacola include inhalation, ingestion, and dermal contact of various contaminants that may be present in shallow and deep soils and groundwater. As the focus of this field investigation is to sample various media, concentrations of the chemical hazards present are not fully determined. Based on the site history and the most recent sampling efforts, PAHs and metals with emphasis on lead as the controlling toxicity substance have been identified as the primary contaminants:

Lead - Lead is also harmful to adults. Adults can suffer from:

- Difficulties during pregnancy
- Other reproductive problems (in both men and women)
- High blood pressure
- Digestive problems
- Nerve disorders
- Memory and concentration problems
- Muscle and joint pain

Polyaromatic Hydrocarbons (PAHs) – Generally speaking, these substances are shown to be skin, eye, and mucous membrane irritants. Some of the isomers such as cresol/creosote (fluoranthene and pyrene) are also considered to be photosensitizers. These substances are considered mildly to be moderately toxic by ingestion.

Benzo(a)pyrene is regulated primarily as a result of potential carcinogenic properties and is listed by NTP, IARC, and ACGIH as carcinogenic.

Acute exposures may result in difficulty breathing, respiratory failure and skin and eye burns. Chronic exposure may damage the liver, kidneys, lungs and skin. Due to age, dilution, and impurities these materials may not represent the pure compounds. It is anticipated that these substances if encountered will be in a particulate form.

Metals – Previous sampling results have indicated that various metals were also encountered in excess of FDEP screening guidelines including antimony, arsenic, copper, iron, lead, nickel, zinc, and vanadium. Much of the toxicology information available discusses exposure to metal fume through inhalation. Generally speaking, exposure to these metals in this form (fume) and particulate form may result in irritation of the mucous membranes of the respiratory tract, possible dryness of the throat, coughing, and sometimes accompanied by a metallic taste in the mouth. Gastrointestinal disturbances (nausea, vomiting, diarrhea, colicky abdominal pain) are characteristic of exposure through ingestion. Arsenic and nickel have been identified as carcinogens.

It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (soil borings, sampling, etc.). Exposure to these compounds is most likely to occur through inhalation or dermal contact of contaminated soil or water, or through ingestion via hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (e.g., washing face and hands before leaving site) will be extremely important. Inhalation exposure will be monitored using a Particulate Meter.

Potential exposure - Given the nature of planned activities, source concentrations, and environmental setting (conducted outside in the open air), it is highly unlikely that any appreciable airborne concentrations will be present.

Other sources of potential chemical exposure are decontamination fluids (e.g., Liquinox, isopropanol), and analytical preservatives. For any substances brought onto the site, the SHSO is responsible for instituting a site-specific Hazard Communication Program (see Section 5.0 of the TtNUS Health and Safety Guidance Manual) and for collecting the appropriate Material Safety Data Sheets (MSDS) from the chemical manufacturers/suppliers. The SHSO is also responsible for completing the Safe Work Permit for the decontamination task using the appropriate MSDS and for reviewing the contents of the MSDSs and Safe Work Permit with anyone who will use these substances.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAS PENSACOLA, FLORIDA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO ₃ or H ₂ O ₂ desorption; or Atomic absorption detection. NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m ³ ACGIH: 0.05 mg/m ³ NIOSH: 0.10 mg/m ³ IDLH: 100 mg/m ³ as lead	The use of a air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m ³ . Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3164°F; 1740°C Melting Pt: 621°F; 327°C Solubility: Insoluble Flash Pt: Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not applicable UEL/UFL: Not applicable Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 11.34 Incompatibilities: Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids Appearance and Odor: Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.

6.2 PHYSICAL HAZARDS

In addition to the chemical hazards discussed above, the following physical hazards may be present during the performance of the site activities.

- Slips, trips, and falls
- Cuts (or other injuries associated with hand tool use)
- Lifting (strain/muscle pulls)
- Ambient temperature extremes (cold and heat stress)
- Pinches and compressions
- Heavy equipment hazards (rotating equipment, hydraulic lines, etc.)
- Energized systems (contact with underground or overhead utilities)
- Vehicular and foot traffic
- Noise in excess of 85 dBA
- Flying projectiles

Each of these physical hazards is discussed in greater detail in Section 4.0 of the TtNUS health and Safety Guidance Manual. Additionally, information on the associated control measures for these hazards are discussed in Table 5-1 of this HASP.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. As previously discussed, this area is well maintained and therefore hazards of this nature are not considered predominant hazards. It should be noted that activities along the water may increase the potential to encounter snakes, insects - ticks, bees, mosquitoes, snakes, alligators, and poisonous vegetation.

For more information concerning these hazards see Section 4.0 of the HSGM. The following information is specific to the region and therefore not in the HSGM.

6.3.1 Insect Bites and Stings

Various insects and animals may be present and should be considered. For example, fire ants present a unique situation when working outdoors in the southern portion of the United States. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects venom (formic acid) that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in

extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician. Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

Insect/animal bites and stings are difficult to control given the climate and environmental setting of NAS Pensacola. However, in an effort to minimize this hazard the following control measures will be implemented where possible.

- Commercially available bug sprays and repellents will be used whenever possible – Pesticides analytical screening includes chlordane, endrin, lindane, methoxychlor, toxaphene and heptachlor. Commercially available repellants may be used providing they don't contain substances which appear on the analytical list for pesticide analysis. Products such as Permanone should not be applied directly to the skin due to potential irritation. This product, when permitted for use, should be applied over clothing articles. Products such as DEET can be applied directly to the skin. In all cases follow the manufacturers instructions.
- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn. This will also aid in insect control by providing a barrier between the field person and the insects and to provide easy recognition of crawling insects against the lighter background. Pant legs should be secured to the work-boots using duct tape to prevent access by ticks. Mosquito nets are also recommended for use when commercially available repellents are not permitted.
- Clothing/limited body checks for ticks and other crawling insects should be conducted upon exiting heavily vegetated areas. Workers should perform a more detailed check of themselves when showering in the evening. Ticks prefer moist areas of the body (arm-pits, genitals, etc.) and will migrate to those locations. However, in many of the reported cases attachment has occurred on the back near the shoulders.
- The FOL/SHSO will preview access routes and work areas in an effort to identify physical hazards including nesting areas in and around the work sites. These areas will be flagged and communicated to site personnel.
- The FOL/SHSO must determine if site personnel (through completion of Medical Data Sheets), suffer allergic reactions to bee and other insect stings and bites. Field crew members who are allergic to bites

should have their emergency kit containing antihistamine and a preloaded syringe of epinephrine readily available.

Any allergies (insect bites, bee stings, etc.) must be reported on the Medical Data Sheet and to the SHSO.

6.3.1.1 Tick and Mosquito Transmitted Illnesses and Diseases

Ticks and mosquitoes have been identified in the transmission of diseases including Lyme's disease and malaria. Warm months (Spring through early Fall) are the most predominant time for this hazard. Information concerning Lyme's Disease including recognition, evaluation, tick removal, and control is provided in Section 4.0 of the TtNUS Health and Safety Guidance Manual.

Malaria may occur when a mosquito or other infected insect sucks blood from an infected person, and the insect becomes the carrier to infect other hosts. The parasite reproduces within the mosquito, and is then passed on to another person through the biting action. Acute symptoms include chills accompanied by fever and general flu like symptoms. This generally terminates in a sweating stage. These symptoms may recur every 48 to 72 hours.

West Nile Virus (WNV)

The WNV is a type of virus that causes encephalitis or inflammation of the brain. The virus is transmitted by mosquitoes that acquire it from infected birds. Symptoms generally occur five to 15 days following the bite of an infected mosquito, and range from a slight fever or headache to rapid onset of severe headache, high fever, stiff neck, muscle weakness, disorientation and death.

WNV encephalitis has no specific treatment. In northern areas of the world, WNV encephalitis cases occur primarily in the late summer or early fall. In southern climates, where temperatures are milder, WN encephalitis can occur year round. There is no vaccine.

Precautions include:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin. An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30% DEET.

- Spray clothing with repellents containing permethrin or DEET, mosquitoes may bite through thin clothing.

6.3.2 Snakes of Florida

The poisonous snakes found in Florida are the coral snake, cottonmouth or water moccasin, copperhead, and the pygmy, timber, and diamondback rattlesnakes. Initial efforts will be directed to avoid, where possible, nesting and territorial areas. Again, it is not anticipated that these reptiles will be encountered the following is provided only for informational purposes.

Coral Snake

Coral Snakes are extremely poisonous snakes with small, blunt heads and brightly colored bodies. They do not strike as effectively as other venomous snakes, but they bite. They are dangerous if stepped on or handled. The *eastern* coral snake generally ranges from 20 to 40 inches in length. Its body is encircled by broad black and red bands separated by narrow yellow ones. Just behind the snake's black snout is a wide yellow band followed by a black band. Some are covered with black pigment that hides much of the red color. Some nonpoisonous snakes look like coral snakes because they have similar coloring. But coral snakes have red bands next to yellow ones. The harmless snakes have red bands next to black ones.

Cotton Mouth or Water Moccasin

The water moccasin is a pit viper. It has a hollow, or pit, in the side of its head, between and slightly below the eye and nostril. Several harmless water snakes have a broad head like the moccasin, but they lack the pit. Adult water moccasins are about 3 ½ feet long, though some grow to more than 5 feet long. They usually have broad dark bands across their bodies. Water moccasins feed on a wide variety of animals, including frogs, fish, small mammals, and birds. Water moccasins are most often seen in watery places, in the swampy backwaters of rivers and streams, and on marshy lakeshores. The bite of the water moccasin is highly dangerous and may be fatal. This snake is also called a cottonmouth because when threatened it throws back its head and flashes its white-lined mouth as a warning signal.

Copperhead

Copperhead is also a poisonous pit viper. Its body has broad chestnut-red bands. Most copperheads are about 2 ½ feet long while the largest grow to about 4 feet. The copperhead bites people more often than most rattlesnakes, partly because it is silent and smaller, and is not so quickly noticed. The bite is seldom fatal to adults. This reptile usually eats rodents and other small mammals by killing them with

their poison and swallowing them whole. Sometimes the snake eats insects and frogs. The copperhead can be identified by the presence of a pit in front of and below each eye. The snake's nostril is in front of the pit.

Rattlesnake

The rattlesnake is a pit viper with a rattle on the end of its tail. The rattle is used to warn enemies to stay away. However, sometimes they give no warning before they bite. The rattlesnake always lifts its tail when it sounds where as harmless snakes that mimic the rattlesnake move their tail back and forth on top of dry leaves or grass.

The diamondback rattler is the heaviest of the poisonous snakes, though not the longest. It gets its name because diamond-shaped blotches edged with yellow cover its body. Diamondbacks rarely grow over feet long.

Pigmy rattlesnakes are short, relatively thick-bodied snakes. They have a dark line through the eye on each side of the face and a series of dark, roughly circular spots running down the center of the back. These dorsal spots interrupt a thin reddish-orange stripe that runs along the midbody line. Pigmy rattlesnakes first line of defense is to remain motionless. Their color pattern makes them hard to see in grass or leaf litter, especially when they are coiled. They almost never warn approaching people by sounding their rattle. They are likely to remain motionless until stepped on or over.

The Timber Rattlesnake has a large body and ranges in length of five to six feet. It has a broad triangular head, vertical pupils and heat sensitive pits. The body color may be yellow, gray, dark brown or black, with dark, V-shaped crossbands across the back. The head is usually unpatterned and is covered with many small scales. A distinct rattle on the end of a darkly colored tail produces a buzzing sound when vibrated.

Rattlesnakes send out poison through two long hollow fangs, in its upper jaw. The poison forms in a pair of glands behind each eye on the upper jaw. The rattlesnake's fangs are folded back in the mouth when not in use. When an angry rattlesnake strikes, the fangs are erected and the mouth opened wide. Most rattlesnakes eat birds, small mammals, amphibians and reptiles. The larger rattlers rank among the most dangerous of snakes and should be avoided

6.3.2.1 Snake Bite

However, should field personnel come in contact with these animals and receive a bite, the following actions are necessary:

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering medical aid to provide prompt and correct antidotes, as necessary.
- Immobilize the bite victim to the extent possible. Physical exertion will mobilize the toxins (if poisonous varieties) from the bite point systemically through the body.
- Apply a pressure wrap (for extremities), just above and over the bite area. With a couple wraps of the pressure wrap in place over the bite area, apply a splint, and continue the application of the pressure wrap. The purpose for the splint is to restrict the movement of the extremity, this along with the pressure wrap will aid in restricting the toxins from leaving the site of the bite.
- Seek medical attention immediately.

6.3.3 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hurricanes, extreme heat and/or cold, etc.), the FOL and/or the SHSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

Tropical Storms and Hurricanes

Pensacola is in a tropical storm, hurricane prone area, the following information is supplied to explain the potential severity of these natural hazards. The decision to curtail operations and evacuate the area should be made by the FOL, TOM, and the HSM.

During the early summer to late fall months, typically from the first of June through the end of November, disturbances migrating off the West Coast of Africa move into the Atlantic Ocean and develop into tropical cyclones known as tropical storms and hurricanes. Many of these cyclones become strong enough to threaten life and property along the Eastern Seaboard and Gulf Coast. There are three main threats associated with tropical storms and hurricanes:

- High winds
- Excessive rainfall
- Storm surge

The impacts of high winds and excessive rainfall occur hours, maybe days, before the tropical storm or hurricane makes landfall. However, the storm surge accompanies the storm or hurricane at the time that landfall occurs.

High Winds

Sustained winds vary greatly from storm to storm, but can range from 39 to 73 miles per hour (wind speeds associated with a tropical storm) to greater than 74 miles per hour (minimal wind speed for a Category 1 hurricane). The table below compares the type of storm or hurricane and the corresponding wind speed.

TABLE 6-2
TROPICAL STORM/HURRICANE RATING SCALE

TYPE	CATEGORY*	WINDS (MPH)
Tropical Depression	NA	>35-38
Tropical Storm	NA	39 – 73
Hurricane	1	74 – 95
Hurricane	2	96 – 110
Hurricane	3	111 – 130
Hurricane	4	131 – 155
Hurricane	5	>155

NA – Not Applicable

* Based on the Saffir-Simpson scale

In addition to strong winds, there is the threat of debris (i.e. building material, trees, etc.) becoming airborne projectiles as they are carried by the high winds. Thunderstorms and tornadoes embedded within the tropical storm or hurricane can further increase the wind speeds on a localized level.

Excessive Rainfall

Heavy rains associated with tropical storms and hurricanes also vary greatly from storm to storm. On average, an inch of rainfall an hour is not uncommon with major hurricanes, somewhat lesser amounts with tropical storms. However, the primary threat is not the intensity of rain, but the duration of rainfall. Since many tropical storms and hurricanes are slow-movers, they are capable of producing sustained heavy rainfall over a long period of time. It is not uncommon for an area to receive nearly 20 inches of rain in 24 hours. Under these conditions, street; stream and creek flooding is inevitable only to be exacerbated by locally heavier rains from thunderstorms.

Storm Surge

The storm surge is an abnormal rise in sea level accompanying a hurricane or tropical storm. The height of the storm surge (usually measured in feet) is the difference in sea level from the observed level (during the storm) and the level that would have occurred in the absence of the storm or hurricane. The more intense the storm or hurricane the higher the storm surge. Storm surges become even higher if they occur during periods of high tide.

The following table defines some of the terminology and possible calls to action regarding tropical cyclones:

TABLE 6-3

TROPICAL STORM/HURRICANE WATCH AND WARNING

STORM DESCRIPTION	DEFINITION	ACTION
Tropical Storm Watch	Tropical storm conditions are possible in the specified area of the watch, usually within 36 hours	Weather conditions should be monitored for further advisories. Prepare for possible evacuation by local officials
Tropical Storm Warning	Tropical storm conditions are expected in the specified area of the warning, usually within 24 hours.	Work should be suspended in areas where lightning, high winds and rainfall could pose a threat to life. Mandatory evacuations may be enforced by local officials.
Hurricane Watch	Hurricane conditions are possible in the specified area of the watch, usually within 36 hours.	Weather conditions should be monitored for further advisories. Prepare for possible evacuation by local officials
Hurricane Warning	Hurricane conditions are expected in the specified area of the warning, usually within 24 hours.	Mandatory evacuations will most likely be enforced by local officials.

A NOAA Weather Radio is the best means to receive watches and warnings from the National Weather Service. The National Weather Service continuously broadcasts updated hurricane advisories that can be received by widely available NOAA Weather Radios.

6.3.3.1 Heat Strain Symptoms

Excessive temperature extremes are considered inclement weather. Given the location and time of the year that work is to be conducted Table 6-4 is provided as a guide to Heat Strain Symptoms.

TABLE 6-4
HEAT STRAIN SYMPTOMS
STOP WORK if Any Worker Demonstrates Any Of The Following

Heart Rate	Sustained (several minutes) heart rate minus worker's age > than 180 beats per minute (bpm) measured at any time.
Body Core Temperature	> 101.3°F (38.5° C)
Recovery Heart Rate	> 110 bpm (Measured 1 minute after peak work effort)
Other symptoms	Sudden and sever fatigue, nausea, dizziness, or headache

Individuals May Be At Greater Risk of Heat Stress If:

Profuse sweating is sustained over hours
Weight loss over a shift is > 1.5% of beginning body weight
24-hour urinary sodium excretion is less than 50 nmoles

7.0 HAZARD MONITORING – TYPES AND ACTION LEVELS

Direct reading instruments will be used at the sites to evaluate the presence of detectable site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the specific hazards and tasks of an identified operation.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Particulate Meter

- Mathematical calculations indicates that lead is the primary contaminant of concern. The source of lead within the subsurface soils is in sufficient concentrations that a particulate meter must be used to confirm source contaminant are not presenting an exposure condition..

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels which will initiate the use of elevated levels of protection. The SHSO may decide to increase these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the Tetra Tech NUS Equipment Manager and/or rental service employed. Operational checks and field calibration will be performed on the instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the Particulate Meter must be field calibrated daily and an additional field calibration must be performed at the end of each day to

determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure. All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration activities. This information may instead be recorded in a field operations logbook, provided that the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____

PROJECT NO.: _____

[illegible]

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section specifies health and safety training and medical surveillance requirements for both Tetra Tech NUS and subcontractor personnel participating in on site activities.

8.1.1 Requirements For Tetra Tech NUS, Inc. and Subcontractor Personnel

Tetra Tech NUS and subcontractor personnel who will engage in field associated activities as described in this HASP must have:

- Completed 40 hours of introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e).
- Completed 8-Hour Refresher Training, if the identified persons had introductory training more than 12 months prior to site work.
- Completed 8-hour Supervisory training in accordance with 29 CFR 1910.120(e)(4), if their assigned function will involve the supervision of subordinate personnel.

Documentation of introductory training or equivalent work experience, supervisory, and refresher training as well as site-specific training will be maintained at the site. Copies of certificates or other official documentation will be used to fulfill this requirement.

8.2 SITE-SPECIFIC TRAINING

Tetra Tech NUS will provide site-specific training to Tetra Tech NUS employees and subcontractor personnel who will perform work on this project.

Figure 8-1 will be used to document the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting will be held daily to discuss operations planned for that day. At the end of the workday, a short meeting may be held to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 10.2).

8.3 MEDICAL SURVEILLANCE

8.3.1 Medical Surveillance Requirements for Tetra Tech NUS and Subcontractor Personnel

Tetra Tech NUS and subcontractor personnel participating in project field activities will have had a physical examination. Physical examinations shall meet the minimum requirements of paragraph (f) of OSHA 29 CFR 1910.120. The physical examinations will be performed to ensure that personnel are medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained at the job site and made available, as necessary. Subcontractor personnel may use an alternative documentation for this purpose. The "Subcontractor Medical Approval Form" can be used to satisfy this requirement, or a letter from an officer of the company. The letter should state that the persons listed in the letter participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response." The letter should further state the following:

- The persons listed have had physical examinations under this program within the frequency as determined sufficient by their occupational health care provider
- Date of the exam
- The persons identified have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive- and negative- pressure respiratory protection.

A sample Subcontractor Medical Approval Form and form letter have been provided to eligible subcontractors in the Bid Specification package.

8.3.2 Requirements for Field Personnel

Each field team member, including subcontractors and visitors, entering the exclusion zone(s) shall be required to complete and submit a copy of the Medical Data Sheet that is available in Attachment V of this HASP. This shall be provided to the SHSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTION

If through the execution of their contract elements the subcontractor will not enter the exclusion zone and there is no potential for exposure to site contaminants, subcontractor personnel may be exempt from the

training and medical surveillance requirements with the exception of Section 8.2. Examples of subcontractors who may qualify as exempt from training and medical surveillance requirements may include surveyors who perform surveying activities in site perimeter areas or areas where there is no potential for exposure to site contaminants and support or restoration services. **Use of this Subcontractor Exception is strictly limited to the authority of the CLEAN Health and Safety Manager.**

FIGURE 8-1
SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing field investigation activities at NAS Pensacola, Pensacola, Florida and that I have received site-specific training that included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction and that the date of my training and my medical surveillance requirements indicated below are accurate.

[illegible]

9.0 SPILL PREVENTION AND CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

This program applies to the single or aggregate accumulation of bulk storage materials (over 55-gallons). As the classification of certain materials such as IDW is unknown, these materials will be treated as hazardous, pending laboratory certification to the contrary. The types of materials for which this program will apply are as follows:

- Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters
- Resource Storage – Limited fuel and lubricant storage

The spill containment and control will be engaged any time there is a release of the above-identified materials from a containment system or vessel. This spill containment program will be engaged in order to minimize associated hazards.

9.2 POTENTIAL SPILL AREAS

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, limited areas are vulnerable to this hazard including:

- Resource deployment
- Waste transfer
- Central staging

It is anticipated that the IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of these analyses will determine the method of disposal.

9.3 CONTAINMENT AREAS

In order to facilitate leak and spill inspection and response, and to minimize potential hazards which may impact the integrity of the storage containers, the staging area for these substances will be structured as follows:

9.3.1 IDW

- 55 Gallon Drums (United Nations 1A2 configurations) – 4 Drums to a Pallet; labels and the retaining ring bolt and nut on the outside of each drum to facilitate easy access; Minimum 4-feet between each row of pallets. The decision to construct a bermed and lined area will be the decision of project management. It is currently planned only to drum purge/development/decontamination generated wash waters. All soil cuttings are to be placed in a roll-off container.
- Roll-off container – The roll-off box used will be lined with a sealable gate. When not in use the roll-off will remain covered to prevent rain water from collecting within the box during rain events. Care should be taken not to overload the roll-off Box. Sandy soil will average (depending on % sand and moisture) between 2500 and 3000 lbs/yd³.
- Storage Tank – Polyethylene Construction – Tank shall be placed into a bermed enclosure of sufficient size to accommodate 110% of anticipated volume (Largest container plus 10% for rainwater and container displacement).

Regardless of container types selected, the staging area will be identified as a Satellite Storage Area with proper signage, points of contact in the event of an emergency, alternate contacts, and identification of stored material (i.e., Purge or decontamination waters, soil cuttings, etc.).

An Inventory Log will be maintained by the FOL regarding types of IDW and volumes generated. An updated Inventory List will be provided by the FOL to the designated Emergency Response Agency or Facility Contact during days off and between shifts or phases of operations.

9.3.2 Flammable/POL Storage

Flammable Storage [i.e., fuels, decontamination solvents (Isopropanol)] and Petroleum/oil/lubricants (POL) will require proper dispensing containers and necessary storage for cumulative volumes in excess of 25 gallons. Storage and dispensing will comply with the following requirements:

- All fuels dispensed from portable containers, will utilize safety cans.
- Portable hand held storage containers will be labeled per Hazard Communication requirements.
- Larger volumes stored for fueling equipment will be stored in approved mobile Above Ground Storage Tanks with secondary containment capable of holding the tank volume plus 10%.
- Portable flammable liquid storage tanks will be properly grounded and will have bonding capabilities for the transfer of loading and off-loading of its contents.

- Dispensing locations will be supported by a Fire Extinguisher positioned no closer than 50 feet from the storage tank, properly mounted and identified.
- The storage location will be well marked with proper signage, protective bumper poles and will have straight through access/egress for vehicles.

9.4 MATERIALS HANDLING

To minimize the hazards associated with moving drums and containers (i.e, lifting, pinch and compression points) material handling will be supported in the following manner:

- A drum cart with pneumatic tires will be required, if drums are to be moved at the IDW storage area. This cart will be used to relocate drums within the staging and satellite storage location.
- In addition, a mechanized means such as a suitably equipped skid loader or back-hoe will be provided to move IDW containers from the field location to the staging and satellite storage location. This piece of equipment will also be used in site clearance and restoration as deemed appropriate and necessary. It is anticipated that this piece of equipment will also be used to load, transport, and dump soils into the roll-off box.

Other means of material handling will be evaluated by the SHSO based on their ability to minimize or eliminate material handling hazards.

9.5 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the Resource Deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the FOL will be notified and the Spill Containment/Control Response Plan as specified in Section 9.8 will be engaged. Inspections will be documented in the project logbook.

9.6 PERSONNEL TRAINING AND SPILL PREVENTION

Personnel will be instructed in the procedures for incipient spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SHSO will serve as the Spill Response Coordinators for this operation, should the need arise. The FOL shall identify two members (at least two) of the project team as the Incidental Spill Response Team. Should an incidental spill occur these individuals will engage incident response measures. It shall be the responsibility of these

individuals to insure they have the supplies and equipment specified in Section 9.7 to support this function. Insufficient supplies or resources should be reported to the FOL.

9.7 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that will always be maintained at the staging areas the purpose of supporting this Spill Containment/Control Plan.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Extra Drums (55-gallon U.N. 1A2) should the need to transfer material from leaking containers arise.
- Pumps (Gas or Electric necessary for transferring liquids from leaking containers)/tubing
- Shovels, rakes, and brooms
- Container labels
- Personal Protective Equipment
 - Nitrile outer gloves
 - Splash Shield
 - Impermeable over-boots
 - Rain suit

9.8 SPILL CONTAINMENT/CONTROL RESPONSE PLAN

This section describes the procedures the Tetra Tech NUS field personnel will employ upon the detection of a spill or leak.

- Notify the SHSO or FOL immediately upon detection of a leak or spill.
- Employ the personal protective equipment stored at the staging area. Initiate incidental spill response measures. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.
- Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.
- Re-containerize spills, including 2-inch of top cover (if over soils) impacted by the spill. Await test results for treatment or disposal options.

- If the spill cannot be controlled or contained, initiate emergency alerting procedures for that area to remove non-essential personnel.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SHSO in accordance with the procedures specified in Section 2.0 of this HASP.

10.0 SITE OPERATIONS AND CONTROL

Site operations and control will be facilitated through the use of established work zones and security and control of those zones. These activities will minimize the impact and spread of contaminants brought to the surface through subsurface investigative methods as well as protect personnel and visitors within these zones during ongoing operations.

10.1 WORK ZONES

Tetra Tech NUS will delineate and use work zones in conjunction with decontamination procedures to prevent the spread of contaminants to other areas of the site. A three-zone approach will be used for work at this site; an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. These will be used to control access to the work areas, restricting the general public, avoiding potentials to spread any contaminants, and to protect individuals who are not cleared to enter by way of training and/or medical surveillance qualifications.

10.1.1 Exclusion Zone

An Exclusion Zone will be established at each sampling point/location. The purpose of the exclusion zone is to define a area where a more rigorous protocol for workers within what is determined to be an impact area. The impact area is that area which could be adversely impacted by either chemical or physical hazards. Exclusion zone size and dimensions will vary based on activities. Impact areas dimensions will be influenced by the following considerations:

- Physical and topographical features of the site
- Weather conditions
- Field and analytical measurements of air and environmental contaminants
- Air dispersion calculations
- Potential for explosion and dispersion
- Physical, chemical and toxicological properties of the contaminants being investigated
- Tasks to be conducted
- Decontamination procedures
- Potential for exposure

As conditions change the dimensions of the exclusion zone will change. However, the following dimensions represent a starting point from which the exclusion zones will be expanded:

- DPT - Soil Boring. The exclusion zone for this activity will be set at the height of the mast, plus five feet surrounding the point of operation, with a minimum of 25-feet. This distance will also apply when surface and subsurface soil sampling from behind these type rigs.
- HSA – Monitoring Well Installation. The exclusion zone for this activity will be set at the height of the mast, plus five feet surrounding the point of operation, or 35-feet, whichever is greater.
- Monitoring well development, sampling, aquifer testing. The exclusion zone for this activity will be set at 10-feet surrounding the well head and discharge collection container.
- Decontamination operation. The exclusion zone for this activity will be set at 25 feet surrounding the gross contamination wash and rinse as well as 25-feet surrounding the heavy equipment decontamination area.
- Investigative Derived Waste (IDW) area will be constructed and barricaded. Only authorized personnel will be allowed access.

Exclusion zones shall remain marked until the SHSO has evaluated the restoration effort and has authorized changing the zone status.

Exclusion zones will be marked using barrier tape, traffic cones and/or drive poles. Signs will be posted to inform and direct site personnel and site visitors.

10.1.2 Contamination Reduction Zone

The contamination reduction zone will be split to represent two separate functions. The first function will be a control/supply point for supporting exclusion zone activities. The second function, which may take place a sufficient distance from the exclusion zone is the decontamination of personnel and heavy equipment.

In order to move from the exclusion zone to a separate location the following activities will be used:

- As samplers move from location to location during sampling activities, dedicated sampling devices and PPE will be washed of gross contamination, removed, separated, and bagged. Personnel will use hygienic wipes, such as Handy Wipes, as necessary for personnel decontamination until they can access the centralized decontamination unit. At the first available opportunity personnel will wash their face and hands. This is critical prior to breaks and lunch when contamination can be transferred to the mouth through hand to mouth contact.
- Muddy over-boots and gloves may be required to go through a gross contamination wash at the exclusion zone. These items will then be cleaned thoroughly at the centralized decontamination unit.
- Potentially contaminated tooling along with PPE will be wrapped, when necessary, for transport to the decontamination area. These items will be disposed of as general refuse.
- Upon completion of the assigned tasks the personnel will move through the central decontamination area to clean reusable PPE and field equipment. Based on ambient conditions medical evaluations may take place at the termination point of the decontamination line. These evaluations will include pulse rate, oral temperature, breathing rate to evaluate physiological demands on site personnel. As stated earlier, these evaluations will be based on ambient conditions and acclimation periods.

10.1.3 Support Zone

The Support Zone will consist of a field trailer, storage, lay-down areas, or some other uncontaminated, controlled point. The Support Zone for this project will include a staging area where site vehicles can be parked, equipment will be unloaded, and where food and drink containers will be maintained. The support zones will be established in clean areas of the site.

10.2 SAFE WORK PERMITS

Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit is included in Figure 10-1. The daily meetings conducted by the FOL/SHSO will further support these work permits. The use of these permits will ensure that site-specific considerations and changing conditions are incorporated into the planning effort. Safe Work Permits will require the signatures of either the FOL or

the SHSO. Personnel engaged in on-site activities must be made aware of the elements indicating levels of protection and precautionary measures to be used.

The use of these permits will establish and provide for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The Safe Work Permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

Upon completion of the work for which the Safe Work Permit was assigned, the Safe Work Permit will be turned into the FOL or the SHSO. Concerns, complaints, and suggestions may be made on the reverse of the Safe Work Permit for consideration by the FOL and/or the SHSO. Permits turned in with suggestions, difficulties, or complaints will be forwarded to the PHSO for review.

The Safe Work Permit and the HASP will serve as the primary reference for work place evaluations and audits conducted to determine if the task is being conducted under the direction conveyed by the HASP and the Safe Work Permit.

10.3 SITE MAP

Once the areas of contamination, access routes, topography, dispersion routes are determined, a site map will be generated and adjusted as site conditions change. This map will be posted to illustrate up-to-date information of contaminants and adjustment of zones and access points. This map will be posted at the field support trailer.

10.4 BUDDY SYSTEM

Personnel engaged in on-site activities will practice the "buddy system" to ensure the safety of the personnel involved in this operation.

**FIGURE 10-1
SAFE WORK PERMIT**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope (To be filled in by person performing work)

I. Work limited to the following (description, area, equipment used): _____

II. Names: _____

III. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

Level D ☐ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required

Full face APR	<input type="checkbox"/>	Escape Pack	<input type="checkbox"/>
Half face APR	<input type="checkbox"/>	SCBA	<input type="checkbox"/>
PAPR	<input type="checkbox"/>	Bottle Trailer	<input type="checkbox"/>
Skid Rig	<input type="checkbox"/>	None	<input type="checkbox"/>

Modifications/Exceptions: _____

V. Chemicals of Concern

Action Level(s)

Response Measures

_____	_____	_____
_____	_____	_____
_____	_____	_____

VI. Additional Safety Equipment/Procedures

Hardhat.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Chemical/splash goggles.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Radio.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Barricades.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash suit/coveralls (Type:_____).....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type).....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe/shank Workboots.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Chemical Protective Over-boots (Type:_____).....	<input type="checkbox"/> Yes <input type="checkbox"/> No		

Modifications/Exceptions: _____

VII. Procedure review with permit acceptors Yes NA Yes NA

Safety shower/eyewash (Location & Use)..... ☐ ☐ Emergency alarms..... ☐ ☐

Procedure for safe job completion..... ☐ ☐ Evacuation routes..... ☐ ☐

Contractor tools/equipment inspected..... ☐ ☐ Assembly points..... ☐ ☐

VII. Site Preparation Yes No NA

Utility Locating and Excavation Clearance completed..... ☐ ☐ ☐

Equipment and Foot Traffic Routes Cleared and Established..... ☐ ☐ ☐

Physical Hazards Barricaded and Isolated..... ☐ ☐ ☐

Emergency Equipment Staged..... ☐ ☐ ☐

VIII. Additional Permits required (Hot work, confined space entry, excavation, etc.). ☐ Yes ☐ No

If yes, See SHSO for appropriate permit

IX. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

10.5 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

Tetra Tech NUS personnel will provide MSDSs for chemicals brought on-site. The contents of these documents will be reviewed by the SHSO with the user(s) of the chemical substances prior to any actual use or application of the substances on-site. The MSDSs will be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request. The SHSO will be responsible for implementing a site-specific Hazard Communication Program (See Section 5.0 of the TtNUS Health and Safety Guidance Manual). This includes collection of MSDSs, creation and maintenance of an accurate Chemical Inventory Listing, addressing container labeling and personnel training issues, and other aspects of Hazard Communication.

10.6 COMMUNICATION

It is anticipated that site personnel will be working in close proximity during proposed field activities. In the event that site personnel are in isolated areas or are separated by significant distances, a supported means of communication between field crews will be utilized. Two-way radio communication devices, if needed, will be used only with NAS Pensacola approval.

External communications will be accomplished utilizing telephones at predetermined and approved locations or through cellular phones. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of site activities, the FOL will determine and arrange for telephone communications, if it is determined a cellular means will not be used. Cellular communications will be tested to insure adequate coverage from all areas of operation. If not provisions for external communication will be made prior to the commencement of site activities.

10.7 SITE VISITORS

Potential site visitors that may be encountered during the performance of the field work could include the following:

- Personnel invited to observe or participate in operations by Tetra Tech NUS.
- Regulatory personnel (i.e., DOD, FDEP, EPA, OSHA, etc.)
- Southern Division Navy personnel
- Other authorized visitors

Non-DOD personnel working on this project are required to gain initial access to the base by coordinating with the TtNUS TOM or designee and following established base access procedures.

Once access to the base is obtained, personnel who require access to Tetra Tech NUS work sites (areas of ongoing operations) will be required to obtain permission from the FOL and the Base Contact. Upon gaining access to the work site, site visitors wishing to observe operations in progress will be required to meet the minimum requirements as stipulated below.

- Site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individuals name (proper identification required), who they represent, and the purpose for the visit. The FOL is responsible for ensuring that site visitors are always escorted while on site.
- Site visitors will be required to produce the necessary information supporting clearance on to the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for Southern Division Navy Personnel), and medical surveillance as stipulated in Section 8.3, of this document. In addition, to enter the sites operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Once the site visitors have completed the above items they will be permitted to enter the site and applicable operational areas. Visitors are required to observe the protective equipment and site restrictions in effect at the work areas visited. Any visitors not meeting the requirements as stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause on-site activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the Base Contact, if necessary. At a minimum, the Base Contact will be notified of any unauthorized visitors.

10.8 SITE SECURITY

As this activity will take place at a Navy facility, the first line of security will be provided by the base gate restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL and Base Contact.

Security at the work areas will be accomplished using field personnel. This is a multiple person operation, involving multiple operational zones. Tetra Tech NUS personnel will retain complete control over active operational zones.

The Base Contact will serve as the focal point for base personnel and interested parties and will serve as the primary enforcement contact.

10.9 SANITATION AND BREAK AREAS

This section will address the following items:

- Toilets
- Potable water
- Showers and change rooms
- Break Areas

10.9.1 Toilets

One toilet will be provided for every 20 people. All toilets will be unisex and will have locking doors. The toilet provided will either be a chemical toilet and service provider or the flush toilet readily accessible at a predetermined approved location.

10.9.2 Potable Water

Potable water as well as electrolyte balance sports drinks such as Gatorade will be provided to the field crews for fluid replacement, as it is necessary under conditions of ambient temperature extremes. Storage and dispensing will proceed as follows:

- All containers will be clean and replenished daily.
- All containers will clearly marked as to their contents (Potable Water – Drinking Water Only; Gatorade, etc.).
- Dispensing locations will be placed in identified break areas within the support zone. The most likely location will be at a support vehicle staged near the work area. This will serve as an area for cooling or warming as well as an identified food and drink consumption area.
- If larger containers are used, dispensing cups will be provided.
- The coolers used for storage of potable drinks and cups will be stored in plastic bags away from potentially contaminating materials when not in use.

Fluid intake recommendations may be made based on the medical evaluations conducted at the end of the decontamination process, as necessary based on ambient conditions.

10.9.3 Showers and Change Rooms

Based on this scope and duration of this project shower facilities and locker rooms will not be required.

10.9.4 Break Areas

Given the location and the time of the year structured suitable locations for work breaks and warming/cooling regimens will be necessary. Shelters such as canopies should be provided for protection from the sun as well as to provide a suitable area to permit cooling in this hot environment.

11.0 CONFINED SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. **Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces.** A confined space is defined as an area which has the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed, and the HSM will have to be notified.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for chemicals brought on site, including decontamination solutions, fuels, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (posted in the site trailers)
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Reference Information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting these documents is not feasible, (such as no office trailer), these documents should be separated and immediately accessible.

Chemical Inventory Listing (posted) - This list represents chemicals brought on-site, including decontamination solutions, sample preservations, fuel, etc.. This list should be posted in a central area.

MSDSs (maintained) - The MSDSs should also be in a central area accessible to site personnel. These documents should match the listings on the chemical inventory list for substances used on-site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster (posted) - this poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies site personnel, dates of training (including site-specific training), and medical surveillance. The lists indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) (posted) - This list of numbers and directions will be maintained at the phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to personnel to be carried on their person.

Hearing Conservation Standard (29 CFR 1910.95) (posted) - this standard will be posted anytime hearing protection or other noise abatement procedures are employed.

Personnel Monitoring (maintained) - The results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels (maintained) - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using Department of Transportation (DOT) placards and acceptable (Hazard Communication 29 CFR 1910.1200(f)) labels.

The purpose of maintaining or posting this information, as stated above, is to allow site personnel quick access. Variations concerning location and methods of presentation are acceptable, providing the objection is accomplished.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
CERCLA	Comprehensive Environmental Response Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
DPT	Direct-Push Technology
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDW	Investigation-derived Waste
MSDS	Material Safety Data Sheet
N/A	Not Available
NAS	Naval Air Station
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PPE	Personal Protective Equipment
SOPs	Standard Operating Procedures
SHSO	Site Health and Safety Officer
STEL	Short Term Exposure Limit
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
TWA	Time Weighted Average
VOCs	Volatile Organic Compounds

ATTACHMENT I

**INJURY/ILLNESS PROCEDURE
AND REPORT FORM**

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE WORKER'S COMPENSATION PROGRAM

WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:

- Stop work as needed to ensure no further harm is done.
- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room. Check with your office location or project health and safety plan for specific instructions.
- If incident involves an injury, illness, or chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Duffy at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours of the injury. You will be required to complete an [Injury/Illness Report](#). You may also be required to participate in a more detailed investigation with the Health Sciences Department.
- In the event of a serious near-miss incident, a "Serious Near Miss Report" (Form AR-2, available online at <https://go2.tetrattech.com> under "Departments", "Health and Safety", "Accident Reporting Procedures", hyperlink for "Serious Near Miss Report") must be completed and faxed to the Corporate Health and Safety Manager within 48 hours.
- If further medical treatment is needed, our insurance carrier, ACE, will provide information on the authorized providers customized to the location of the injured employee. You can find this information by accessing the website of ACE's claims handler, ESIS, at : www.esis.com. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local Human Resources representative (Marilyn Duffy), Corporate Health and Safety Manager (Matt Soltis), or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries pay premiums on behalf of their employees. This program is based on a no-fault system, and benefits are provided for covered events as an exclusive remedy to the injured employee regardless of fault. The types of injuries or illnesses covered and the amount of

benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits from the first day of work. All employees must follow the above injury/illness reporting procedures. If you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.

Consultants, independent contractors, and employees of subcontractors and employees from temporary employment agencies are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
Subsidiary Health and Safety Representative

Prepared by: _____

Position: _____

cc: _____
Workers Compensation Administrator

Office: _____

Project name: _____

Telephone number: _____

Project number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Office: _____

Home address: _____

Gender: M ☐ F ☐ No. of dependents: _____

Marital status: _____

Home telephone number: _____

Date of birth: _____

Occupation (regular job title): _____

Social security number: _____

Department: _____

Date of Accident: _____

Time of Accident: _____ a.m. ☐ p.m. ☐

Time Employee Began Work: _____

☐ Check if time cannot be determined

Location of Incident

Street address: _____

City, state, and zip code: _____

County: _____

Was place of accident or exposure on employer's premises? Yes ☐ No ☐

Information About the Incident

What was the employee doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the employee was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time"

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

What was the injury or illness? Describe the part(s) of the body affected and how it was affected. Be more specific than "hurt," "pain," or "sore." Examples "Strained back"; "Chemical burn, right hand"; "Carpal tunnel syndrome, left wrist"

Describe the Object or Substance that Directly Harmed the Employee: Examples: "Concrete floor"; "Chlorine"; "Radial arm saw." If this question does not apply to the incident, write "Not applicable."

Did the employee die? Yes ☐ No ☐ Date of death: _____

Was employee performing regular job duties? Yes ☐ No ☐

Was safety equipment provided? Yes ☐ No ☐ Was safety equipment used? Yes ☐ No ☐

Note: Attach any police reports or related diagrams to this report.

Witness (Attach additional sheets for other witnesses.)

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Medical Treatment Required? ☐ Yes ☐ No ☐ First aid only

Name of physician or health care professional: _____

If treatment was provided away from the work site, provide the information below.

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Was the employee treated in an emergency room? ☐ Yes ☐ No

Was the employee hospitalized over night as an in-patient? ☐ Yes ☐ No

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: _____

Date of Report: _____ **Time of Report:** _____

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

Printed Name of Injured Employee

Telephone Number

Signature of Injured Employee

Date

The signatures provided below indicate that appropriate personnel have been notified of the incident.

Title	Printed Name	Signature	Telephone Number	Date
Office Manager				
Project Manager				
Site Safety Coordinator or Office Health and Safety Representative				

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To Be Completed by the Subsidiary Health and Safety Representative

Classification of Incident:

☐ Injury ☐ Illness

Result of Incident:

- ☐ First aid only
☐ Days away from work
☐ Remained at work but incident resulted in job transfer or work restriction
☐ Incident involved days away and job transfer or work restriction
☐ Medical treatment only

No. of days away from work _____

Date employee left work _____

Date employee returned to work _____

No. of days placed on restriction or job transfer: _____

OSHA Recordable Case Number _____

To Be Completed by Human Resources

Social security number: _____

Date of hire: _____ Hire date for current job: _____

Wage information: \$ _____ per ☐ Hour ☐ Day ☐ Week ☐ Month

Position at time of hire: _____

Current position: _____ Shift hours: _____

State in which employee was hired: _____

Status: ☐ Full-time ☐ Part-time Hours per week: _____ Days per week: _____

Temporary job end date: _____

To Be Completed during Report to Workers Compensation Carrier

Date reported: _____ Reported by: _____

Confirmation number: _____

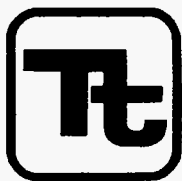
Name of contact: _____

Field office of claims adjuster: _____

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

ATTACHMENT II

**STANDARD OPERATING PROCEDURE
FOR
UTILITY LOCATING AND EXCAVATION CLEARANCE**



TETRA TECH NUS, INC.

STANDARD OPERATING PROCEDURES

Number HS-1.0	Page 1 of 15
Effective Date 12/03	Revision 2
Applicability Tetra Tech NUS, Inc.	
Prepared Health & Safety	
Approved D. Senovich	

Subject
UTILITY LOCATING AND EXCAVATION CLEARANCE

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Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 2 of 15
	Revision 2	Effective Date 12/03

1.0 PURPOSE

Utilities such as electric service lines, natural or propane gas lines, water and sewage lines, telecommunications, and steam lines are very often in the immediate vicinity of work locations. Contact with underground or overhead utilities can have serious consequences including employee injury/fatality, property and equipment damage, substantial financial impacts, and loss of utility service to users.

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility locating services. It is the policy of Tetra Tech NUS, Inc. (TtNUS) to provide a safe and healthful work environment for the protection of our employees. The purpose of this Standard Operating Procedure (SOP) is to aid in achieving the objectives of this policy, to present the acceptable procedures pertaining to utility locating and excavation clearance activities, and to present requirements and restrictions relevant to these types of activities. This SOP must be reviewed by any employee potentially involved with underground or overhead utility locating and avoidance activities.

2.0 SCOPE

This procedure applies to all TtNUS field activities where there may be potential contact with underground or overhead utilities. This procedure provides a description of the principles of operation, instrumentation, applicability, and implementability of typical methods used to determine the presence and avoidance of contact with utility services. This procedure is intended to assist with work planning and scheduling, resource planning, field implementation, and subcontractor procurement. Utility locating and excavation clearance requires site-specific information prior to the initiation of any such activities on a specific project. This SOP is not intended to provide a detailed description of methodology and instrument operation. Specialized expertise during both planning and execution of several of the methods presented may also be required.

3.0 GLOSSARY

Electromagnetic Induction (EMI) Survey - A geophysical exploration method whereby electromagnetic fields are induced in the ground and the resultant secondary electromagnetic fields are detected as a measure of ground conductivity.

Magnetometer – A device used for precise and sensitive measurements of magnetic fields.

Magnetic Survey – A geophysical survey method that depends on detection of magnetic anomalies caused by the presence of buried ferromagnetic objects.

Metal Detection – A geophysical survey method that is based on electromagnetic coupling caused by underground conductive objects.

Vertical Gradiometer – A magnetometer equipped with two sensors that are vertically separated by a fixed distance. It is best suited to map near surface features and is less susceptible to deep geologic features.

Ground Penetrating Radar – Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture.

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4.0 RESPONSIBILITIES

Project Manager (PM)/Task Order Manager (TOM) - Responsible for ensuring that all field activities are conducted in accordance with this procedure.

Site Manager (SM)/Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved SOPs or as otherwise directed by the approved project plan(s).

Site Health & Safety Officer (SHSO) – Responsible to provide technical assistance and verify full compliance with this SOP. The SHSO is also responsible for reporting any deficiencies to the Corporate Health and Safety Manager (HSM) and to the PM/TOM.

Health & Safety Manager (HSM) – Responsible for preparing, implementing, and modifying corporate health and safety policy and this SOP.

Site Personnel – Responsible for performing their work activities in accordance with this SOP and the TtNUS Health and Safety Policy.

5.0 PROCEDURES

This procedure addresses the requirements and technical procedures that must be performed to minimize the potential for contact with underground and overhead utility services. These procedures are addressed individually from a buried and overhead standpoint.

5.1 Buried Utilities

Buried utilities present a heightened concern because their location is not typically obvious by visual observation, and it is common that their presence and/or location is unknown or incorrectly known on client properties. This procedure must be followed prior to beginning any subsurface probing or excavation that might potentially be in the vicinity of underground utility services. In addition, the Utility Clearance Form (Attachment 3) must be completed for every location or cluster of locations where intrusive activities will occur.

Where the positive identification and de-energizing of underground utilities cannot be obtained and confirmed using the following steps, the PM/TOM is responsible for arranging for the procurement of a qualified, experienced, utility locating subcontractor who will accomplish the utility location and demarcation duties specified herein.

1. A comprehensive review must be made of any available property maps, blue lines, or as-builts prior to site activities. Interviews with local personnel familiar with the area should be performed to provide additional information concerning the location of potential underground utilities. Information regarding utility locations shall be added to project maps upon completion of this exercise.
- 2., A visual site inspection must be performed to compare the site plan information to actual field conditions. Any findings must be documented and the site plan/maps revised. The area(s) of proposed excavation or other subsurface activities must be marked at the site in white paint or pin flags to identify those locations of the proposed intrusive activities. The site inspection should focus on locating surface indications of potential underground utilities. Items of interest include the presence of nearby area lights, telephone service, drainage grates, fire hydrants, electrical service vaults/panels, asphalt/concrete scars and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional information regarding utility

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locations shall be added to project maps upon completion of this exercise and returned to the PM/TOM.

3. If the planned work is to be conducted on private property (e.g., military installations, manufacturing facilities, etc.) the FOL must identify and contact appropriate facility personnel (e.g., public works or facility engineering) before any intrusive work begins to inquire about (and comply with) property owner requirements. It is important to note that private property owners may require several days to several weeks advance notice prior to locating utilities.
4. If the work location is on public property, the state agency that performs utility clearances must be notified (see Attachment 1). State "one-call" services must be notified prior to commencing fieldwork per their requirements. Most one-call services require, by law, 48- to 72-hour advance notice prior to beginning any excavation. Such services typically assign a "ticket" number to the particular site. This ticket number must be recorded for future reference and is valid for a specific period of time, but may be extended by contacting the service again. The utility service will notify utility representatives who then mark their respective lines within the specified time frame. It should be noted that most military installations own their own utilities but may lease service and maintenance from area providers. Given this situation, "one call" systems may still be required to provide location services on military installations.
5. Utilities must be identified and their locations plainly marked using pin flags, spray paint, or other accepted means. The location of all utilities must be noted on a field sketch for future inclusion on project maps. Utility locations are to be identified using the following industry-standard color code scheme, unless the property owner or utility locator service uses a different color code:

white	excavation/subsurface investigation location
red	electrical
yellow	gas, oil, steam
orange	telephone, communications
blue	water, irrigation, slurry
green	sewer, drain
6. Where utility locations are not confirmed with a high degree of confidence through drawings, schematics, location services, etc., the work area must be thoroughly investigated prior to beginning the excavation. In these situations, utilities must be identified using safe and effective methods such as passive and intrusive surveys, or the use of non-conductive hand tools. Also, in situations where such hand tools are used, they should always be used in conjunction with suitable detection equipment, such as the items described in Section 6.0 of this SOP. Each method has advantages and disadvantages including complexity, applicability, and price. It also should be noted that in some states, initial excavation is required by hand to a specified depth.
7. At each location where trenching or excavating will occur using a backhoe or other heavy equipment, and where utility identifications and locations cannot be confirmed prior to groundbreaking, the soil must be probed using a device such as a tile probe which is made of non-conductive material such as fiberglass. If these efforts are not successful in clearing the excavation area of suspect utilities, hand shoveling must be performed for the perimeter of the intended excavation.
8. All utilities uncovered or undermined during excavation must be structurally supported to prevent potential damage. Unless necessary as an emergency corrective measure, TtNUS shall not make any repairs or modifications to existing utility lines without prior permission of the utility owner, property owner, and Corporate HSM. All repairs require that the line be locked-out/tagged-out prior to work.

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5.2 Overhead Power Lines

If it is necessary to work within the minimum clearance distance of an overhead power line, the overhead line must be de-energized and grounded, or re-routed by the utility company or a registered electrician. If protective measures such as guarding, isolating, or insulating are provided, these precautions must be adequate to prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

The following table provides the required minimum clearances for working in proximity to overhead power lines.

<u>Nominal Voltage</u>	<u>Minimum Clearance</u>
0 -50 kV	10 feet, or one mast length; whichever is greater
50+ kV	10 feet plus 4 inches for every 10 kV over 50 kV or 1.5 mast lengths; whichever is greater

6.0 UNDERGROUND LOCATING TECHNIQUES

A variety of supplemental utility locating approaches are available and can be applied when additional assurance is needed. The selection of the appropriate method(s) to employ is site-specific and should be tailored to the anticipated conditions, site and project constraints, and personnel capabilities.

6.1 Geophysical Methods

Geophysical methods include electromagnetic induction, magnetics, and ground penetrating radar. Additional details concerning the design and implementation of electromagnetic induction, magnetics, and ground penetrating radar surveys can be found in one or more of the TtNUS SOPs included in the References (Section 8.0).

Electromagnetic Induction

Electromagnetic Induction (EMI) line locators operate either by locating a background signal or by locating a signal introduced into the utility line using a transmitter. A utility line acts like a radio antenna, producing electrons, which can be picked up with a radiofrequency receiver. Electrical current carrying conductors have a 60HZ signal associated with them. This signal occurs in all power lines regardless of voltage. Utilities in close proximity to power lines or used as grounds may also have a 60HZ signal, which can be picked up with an EM receiver. A typical example of this type of geophysical equipment is an EM-61.

EMI locators specifically designed for utility locating use a special signal that is either indirectly induced onto a utility line by placing the transmitter above the line or directly induced using an induction clamp. The clamp induces a signal on the specific utility and is the preferred method of tracing since there is little chance of the resulting signals being interfered with. A good example of this type of equipment is the Schonstedt® MAC-51B locator. The MAC-51B performs inductively traced surveys, simple magnetic locating, and traced nonmetallic surveys.

When access can be gained inside a conduit to be traced, a flexible insulated trace wire can be used. This is very useful for non-metallic conduits but is limited by the availability of gaining access inside the pipe.

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Magnetics

Magnetic locators operate by detecting the relative amounts of buried ferrous metal. They are incapable of locating or identifying nonferrous utility lines but can be very useful for locating underground storage tanks (UST's), steel utility lines, and buried electrical lines. A typical example of this type of equipment is the Schonstedt® GA-52Cx locator. The GA-52Cx is capable of locating 4-inch steel pipe up to 8 feet deep.

Non-ferrous lines are often located by using a typical plumbing tool (snake) fed through the line. A signal is then introduced to the snake that is then traced.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture. In general, an object which is harder than the surrounding soil will reflect a stronger signal. Utilities, tunnels, UST's, and footings will reflect a stronger signal than the surrounding soil. Although this surface detection method may determine the location of a utility, this method does not specifically identify utilities (i.e., water vs. gas, electrical vs. telephone); hence, verification may be necessary using other methods. This method is somewhat limited when used in areas with clay soil types or with a high water table.

6.2 Passive Detection Surveys

Acoustic Surveys

Acoustic location methods are generally most applicable to waterlines or gas lines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing (at joints, leaks, etc.) or to sounds introduced into the water main using a transducer. Acoustics may also be applicable to determine the location of plastic gas lines.

Thermal Imaging

Thermal (i.e., infrared) imaging is a passive method for detecting the heat emitted by an object. Electronics in the infrared camera convert subtle heat differentials into a visual image on the viewfinder or a monitor. The operator does not look for an exact temperature; rather they look for heat anomalies (either elevated or suppressed temperatures) characteristic of a potential utility line.

The thermal fingerprint of underground utilities results from differences in temperature between the atmosphere and the fluid present in a pipe or the heat generated by electrical resistance. In addition, infrared scanners may be capable of detecting differences in the compaction, temperature and moisture content of underground utility trenches. High-performance thermal imagery can detect temperature differences to hundredths of a degree.

6.3 Intrusive Detection Surveys

Vacuum Excavation

Vacuum excavation is used to physically expose utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting

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debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

Hand Excavation

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings and excavations may be cleared via the use of non-conductive hand tools. This should always be done in conjunction with the use of detection equipment. This would be required for all locations where there is a potential to impact buried utilities. The minimum hand-excavation depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 2 presents frost line depths for the regions of the contiguous United States. At a minimum, hand excavation depths must be at least to the frost line depth (see Attachment 2) plus two (2) feet, but never less than 4 feet below ground surface (bgs). For hand excavation, the hole created must be reamed large enough to be at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand excavation. It is important to note that a post-hole digger must not be used in this type of hand excavation activity.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, non-conductive tile probes may be used. A tile probe is a "T"-handled rod of varying lengths that can be pushed into the soil to determine if any obstructions exist at that location. Tile probes constructed of fiberglass or other nonconductive material are readily-available from numerous vendors. Tile probes must be performed to the same depth requirements as previously specified. As with other types of hand excavating activities, the use of a non-conductive tile probe, should always be in conjunction with suitable utility locating detection equipment.

7.0 INTRUSIVE ACTIVITIES SUMMARY

The following list summarizes the activities that must be performed prior to beginning subsurface activities:

1. Map and mark all subsurface locations and excavation boundaries using white paint or markers specified by the client or property owner.
2. Notify the property owner and/or client that the locations are marked. At this point, drawings of locations or excavation boundaries shall be provided to the property owner and/or client so they may initiate (if applicable) utility clearance.

Note: Drawings with confirmed locations should be provided to the property owner and/or client as soon as possible to reduce potential time delays.

3. Notify "One Call" service. If possible, arrange for an appointment to show the One Call representative the surface locations or excavation boundaries in person. This will provide a better location designation to the utilities they represent. You should have additional drawings should you need to provide plot plans to the One Call service.
4. Implement supplemental utility detection techniques as necessary and appropriate to conform utility locations or the absence thereof.

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5. Complete Attachment 3, Utility Clearance Form. This form should be completed for each excavation location. In situations where multiple subsurface locations exist within the close proximity of one another, one form may be used for multiple locations provided those locations are noted on the Utility Clearance Form. Upon completion, the Utility Clearance Form and revised/annotated utility location map becomes part of the project file.

8.0 REFERENCES

OSHA Letter of Interpretation, Mr. Joseph Caldwell, Attachment 4
 OSHA 29 CFR 1926(b)(2)
 OSHA 29 CFR 1926(b)(3)
 TtNUS Utility Locating and Clearance Policy
 TtNUS SOP GH-3.1; Resistivity and Electromagnetic Induction
 TtNUS SOP GH-3.2; Magnetic and Metal Detection Surveys
 TtNUS SOP GH-3.4; Ground-penetrating Radar Surveys

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ATTACHMENT 1 **LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES**



American Public Works Association
2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2625
Phone (816) 472-6100 • Fax (816) 472-1610
Web www.apwa.net • E-mail apwa@apwa.net

ONE-CALL SYSTEMS INTERNATIONAL CONDENSED DIRECTORY

Alabama
Alabama One-Call
1-800-292-8525

Alaska
Locate Call Center of Alaska, Inc.
1-800-478-3121

Arizona
Arizona Blue Stake
1-800-782-5348

Arkansas
Arkansas One Call System, Inc.
1-800-482-8998

California
Underground Service Alert North
1-800-227-2600
Underground Service Alert of Southern
California
1-800-227-2600

Colorado
Utility Notification Center of Colorado
1-800-922-1987

Connecticut
Call Before You Dig
1-800-922-4455

Delaware
Miss Utility of Delmarva
1-800-282-8555

Florida
Sunshine State One-Call of Florida, Inc.
1-800-432-4770

Georgia
Underground Protection Center, Inc.
1-800-282-7411

Hawaii
Underground Service Alert North
1-800-227-2600

Idaho
Dig Line Inc.
1-800-342-1585
Kootenai County One-Call
1-800-428-4950
Shoshone - Benewah One-Call
1-800-398-3285

Illinois
JULIE, Inc.
1-800-892-0123
Digger (Chicago Utility Alert Network)
312-744-7000

Indiana
Indiana Underground Plant Protection
Service
1-800-382-5544

Iowa
Iowa One-Call
1-800-292-8989

Kansas
Kansas One-Call System, Inc.
1-800-344-7233

Kentucky
Kentucky Underground Protection Inc.
1-800-752-6007

Louisiana
Louisiana One Call System, Inc.
1-800-272-3020

Maine
Dig Safe System, Inc.
1-888-344-7233

Maryland
Miss Utility
1-800-257-7777
Miss Utility of Delmarva
1-800-282-8555

Massachusetts
Dig Safe System, Inc.
1-888-344-7233

Michigan
Miss Dig System, Inc.
1-800-482-7171

Minnesota
Gopher State One Call
1-800-252-1168

Mississippi
Mississippi One-Call System, Inc.
1-800-227-6477

Missouri
Missouri One-Call System, Inc.
1-800-344-7483

Montana
Utilities Underground Protection Center
1-800-424-5555
Montana One Call Center
1-800-551-8344

Nebraska
Diggers Hotline of Nebraska
1-800-331-5666

Nevada
Underground Service Alert North
1-800-227-2600

New Hampshire
Dig Safe System, Inc.
1-888-344-7233

New Jersey
New Jersey One Call
1-800-272-1000

New Mexico
New Mexico One Call System, Inc.
1-800-321-2537
Las Cruces- Dona Ana Blue Stakes
1-888-526-0400

New York
Dig Safely New York
1-800-862-7962
New York City- Long Island One Call
Center
1-800-272-4480

North Carolina
The North Carolina One-Call Center,
Inc.
1-800-632-4949

North Dakota
North Dakota One-Call
1-800-795-0555

Ohio
Ohio Utilities Protection Service
1-800-362-2764
Oil & Gas Producers Underground
Protect'n Svc
1-800-925-0988

Oklahoma
Call Okie
1-800-522-6543

Oregon
Oregon Utility Notification Center/One
Call Concepts
1-800-332-2344

Pennsylvania
Pennsylvania One Call System, Inc.
1-800-242-1776

Rhode Island
Dig Safe System, Inc.
1-888-344-7233

South Carolina
Palmetto Utility Protection Service Inc.
1-888-721-7877

South Dakota
South Dakota One Call
1-800-781-7474

Tennessee
Tennessee One-Call System, Inc.
1-800-351-1111

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ATTACHMENT 1 (Continued)

Texas

Texas One Call System
1-800-245-4545
Texas Excavation Safety System, Inc.
1-800-344-8377
Lone Star Notification Center
1-800-669-8344

Utah

Blue Stakes of Utah
1-800-662-4111

Vermont

Dig Safe System, Inc.
1-888-344-7233

Virginia

Miss Utility of Virginia
1-800-552-7001
Miss Utility (Northern Virginia)
1-800-257-7777

Washington

Utilities Underground Location Center
1-800-424-5555
Northwest Utility Notification Center
1-800-553-4344
Inland Empire Utility Coordinating
Council
509-456-8000

West Virginia

Miss Utility of West Virginia, Inc.
1-800-245-4848

Wisconsin

Diggers Hotline, Inc.
1-800-242-8511

Wyoming

Wyoming One-Call System, Inc.
1-800-348-1030
Call Before You Dig of Wyoming
1-800-849-2476

District of Columbia

Miss Utility
1-800-257-7777

Alberta

Alberta One-Call Corporation
1-800-242-3447

British Columbia

BC One Call
1-800-474-6886

Ontario

Ontario One-Call System
1-800-400-2255

Quebec

Info-Excavation
1-800-663-9228

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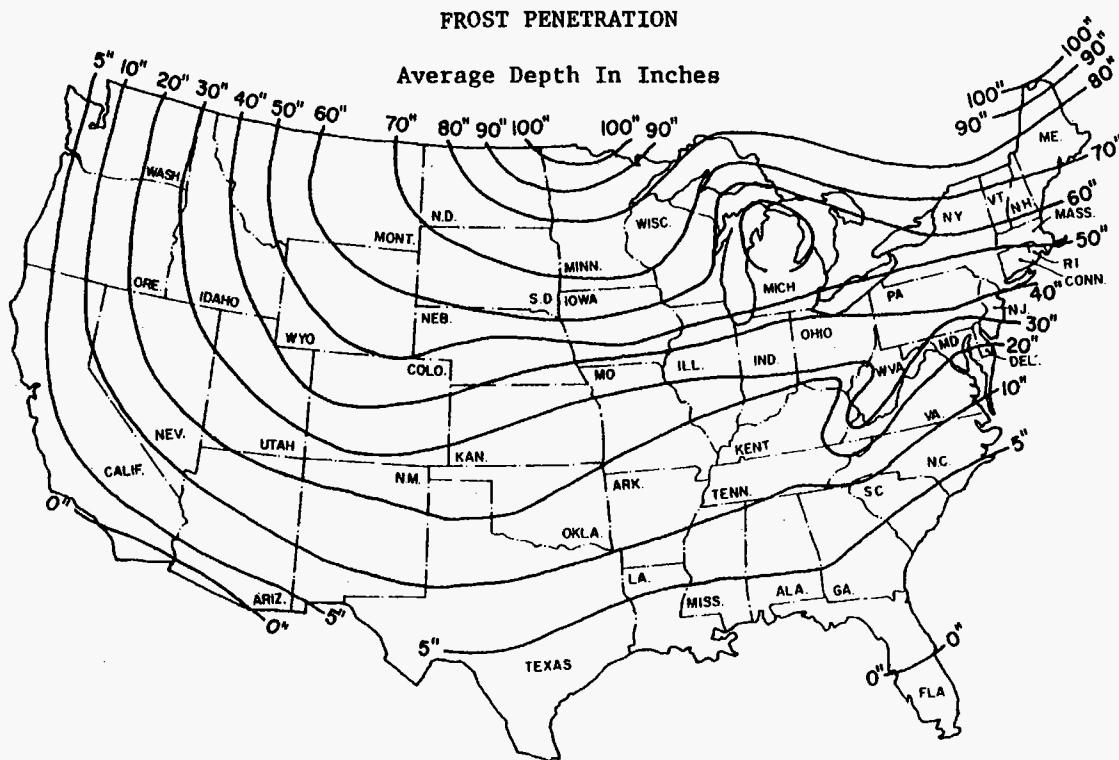
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ATTACHMENT 2

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION



Courtesy U.S. Department Of Commerce

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**ATTACHMENT 3
UTILITY CLEARANCE FORM**

Client: _____ Project Name: _____
 Project No.: _____ Completed By: _____
 Location Name: _____ Work Date: _____
 Excavation Method/Overhead Equipment: _____

1. Underground Utilities Circle One
- a) Review of existing maps? yes no N/A
- b) Interview local personnel? yes no N/A
- c) Site visit and inspection? yes no N/A
- d) Excavation areas marked in the field? yes no N/A
- e) Utilities located in the field? yes no N/A
- f) Located utilities marked/added to site maps? yes no N/A
- g) Client contact notified yes no N/A
 Name _____ Telephone: _____ Date: _____
- g) State One-Call agency called? yes no N/A
 Caller: _____
 Ticket Number: _____ Date: _____
- h) Geophysical survey performed? yes no N/A
 Survey performed by: _____
 Method: _____ Date: _____
- i) Hand excavation performed (with concurrent use of utility yes no N/A
 detection device)?
 Completed by: _____
 Total depth: _____ feet Date: _____
- j) Trench/excavation probed? yes no N/A
 Probing completed by: _____
 Depth/frequency: _____ Date: _____
2. Overhead Utilities Present Absent
- a) Determination of nominal voltage yes no N/A
- b) Marked on site maps yes no N/A
- c) Necessary to lockout/insulate/re-route yes no N/A
- d) Document procedures used to lockout/insulate/re-route yes no N/A
- e) Minimum acceptable clearance (SOP Section 5.2): _____

3. Notes: _____

Approval:

 Site Manager/Field Operations Leader

 Date

c: PM/Project File
 Program File

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ATTACHMENT 4 OSHA LETTER OF INTERPRETATION

Mr. Joseph Caldwell
Consultant
Governmental Liaison
Pipeline Safety Regulations
211 Wilson Boulevard
Suite 700
Arlington, Virginia 22201

Re: Use of hydro-vacuum or non-conductive hand tools to locate underground utilities.

Dear Mr. Caldwell:

In a letter dated July 7, 2003, we responded to your inquiry of September 18, 2002, regarding the use of hydro-vacuum equipment to locate underground utilities by excavation. After our letter to you was posted on the OSHA website, we received numerous inquiries that make it apparent that aspects of our July 7 letter are being misunderstood. In addition, a number of industry stakeholders, including the National Utility Contractors Association (NUCA), have provided new information regarding equipment that is available for this work.

To clarify these issues, we are withdrawing our July 7 letter and issuing this replacement response to your inquiry.

***Question:** Section 1926.651 contains several requirements that relate to the safety of employees engaged in excavation work. Specifically, paragraphs (b)(2) and (b)(3) relate in part to the safety of the means used to locate underground utility installations that, if damaged during an uncovering operation, could pose serious hazards to employees.*

Under these provisions, what constitutes an acceptable method of uncovering underground utility lines, and further, would the use of hydro-vacuum excavation be acceptable under the standard?

Answer

Background

Two sections of 29 CFR 1926 Subpart P (Excavations), 1926.651(Specific excavation requirements), govern methods for uncovering underground utility installations. Specifically, paragraph (b)(2) states:

When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours * * * or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used. (emphasis added).

Paragraph (b)(3) provides:

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When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. (emphasis added).

Therefore, “acceptable means” must be used where the location of the underground utilities have not been identified by the utility companies and detection equipment is not used.

Subpart P does not contain a definition of either “other acceptable means” or “safe and acceptable means.” The preambles to both the proposed rule and the final rule discussed the rationale behind the wording at issue. For example, the preamble to the proposed rule, 52 Fed. Reg. 12301 (April 15, 1987), noted that a 1972 version of this standard contained language that specified “careful probing or hand digging” as the means to uncover utilities. The preamble then noted that an amendment to the 1972 standard later deleted that language “to allow other, *equally effective means* of locating such installations.” The preamble continued that in the 1987 proposed rule, OSHA again proposed using language in section (b)(3) that would provide another example of an acceptable method of uncovering utilities that could be used where the utilities have not been marked and detection equipment is not being used – “probing with hand-held tools.” This method was rejected in the final version of 29 CFR 1926. As OSHA explained in the preamble to the final rule, 54 Fed. Reg. 45916 (October 31, 1989):

OSHA received two comments * * * and input from ACCSH [OSHA’s Advisory Committee on Construction Safety and Health] * * * on this provision. All commenters recommended dropping ‘such as probing with hand-held tools’ from the proposed provision, because this could create a hazard to employees by damaging the installation or its insulation.

In other words, the commenters objected to the use of hand tools being used unless detection equipment was used in conjunction with them. OSHA then concluded its discussion relative to this provision by agreeing with the commentators and ultimately not including any examples of “acceptable means” in the final provision.

Non-conductive hand tools are permitted

This raises the question of whether the standard permits the use of hand tools alone -- without also using detection equipment. NUCA and other industry stakeholders have recently informed us that non-conductive hand tools that are appropriate to be used to locate underground utilities are now commonly available.

Such tools, such as a “shooter” (which has a non-conductive handle and a snub nose) and non-conductive or insulated probes were not discussed in the rulemaking. Since they were not considered at that time, they were not part of the class of equipment that was thought to be unsafe for this purpose. Therefore, we conclude that the use of these types of hand tools, when used with appropriate caution, is an “acceptable means” for locating underground utilities.

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ATTACHMENT 4 (Continued)

Hydro-vacuum excavation

It is our understanding that some hydro-vacuum excavation equipment can be adjusted to use a minimum amount of water and suction pressure. When appropriately adjusted so that the equipment will not damage underground utilities (especially utilities that are particularly vulnerable to damage, such as electrical lines), use of such equipment would be considered a "acceptable means" of locating underground utilities. However, if the equipment cannot be sufficiently adjusted, then this method would not be acceptable under the standard.

Other technologies

We are not suggesting that these are the only devices that would be "acceptable means" under the standard. Industry stakeholders have informed us that there are other types of special excavation equipment designed for safely locating utilities as well.

We apologize for any confusion our July 7 letter may have caused. If you have further concerns or questions, please feel free to contact us again by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Compliance Assistance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Russell B. Swanson, Director
Directorate of Construction

NOTE: OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.

ATTACHMENT III

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION FOR DRILL RIGS

COMPANY: _____ **UNIT NO.** _____
FREQUENCY: Inspect at the initiation of the project, after repairs, once every 10-day shift.

Inspection Date: ____/____/____ Time: _____ Equipment Type: _____
(e.g., **Drill Rigs** Hollow Stem, Mud Rotary, Direct Push)

	Good	Need Repair	N/A
Emergency Stop Devices (At points of operation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tires (Tread) or tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoses and belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cab, mirrors, safety glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Is the equipment equipped with audible back-up alarms and back-up lights?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horn and gauges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brake condition (dynamic, park, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire extinguisher (Type/Rating - _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluid Levels:			
- Engine oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Transmission fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Brake fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Cooling system fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Windshield wipers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Hydraulic oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil leak/lube <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Coupling devices and connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mast condition (Mast Height _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access-ways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steering (standard and emergency)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power cable and/or hoist cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
➤ Hooks			
- Safety Latch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Wear in excess of 10% original dimension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- A bend or twist exceeding 10% from the plane of an unbent hook	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Increase in throat opening exceeding 15% from new condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Excessive nicks and/or gouges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
➤ Wire Rope (Hoist Mechanism)			
- Reduction in Rope diameter (5/16 wire rope > 1/64 reduction nominal size -replace) (3/8 to 1/2 wire rope > 1/32 reduction nominal size-replace) (9/16 to 3/4 wire rope > 3/64 reduction nominal size-replace)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Number of broken wires (12 randomly broken wires in one rope lay) (4 broken wires in one strand)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Lead (primary) sheave is centered on the running drum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Lubrication of wire rope (adequate?)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Good	Needs Repaired	N/A
- Number of U-Type (Crosby) Clips (5/16 – 5/8 = 3 clips minimum) (3/4 – 1 inch = 4 clips minimum) (1 1/8 – 1 3/8 inch = 5 clips minimum)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
➤ Kinks, bends – Flattened to > 50% diameter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
➤ Hemp/Fiber rope (Cathead/Split Spoon Hammer)			
- Minimum 3/4; maximum 1 inch rope diameter (Inspect for physical damage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Rope to hammer is securely fastened	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Safety Guards:

	Yes	No
Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
Hot pipes and surfaces exposed to accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
All emergency shut offs have been identified and communicated to the field crew? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are any structural members bent, rusted, or otherwise show signs of damage? _____	<input type="checkbox"/>	<input type="checkbox"/>
Are fueling cans used with this equipment approved type safety cans? _____	<input type="checkbox"/>	<input type="checkbox"/>
Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use? _____	<input type="checkbox"/>	<input type="checkbox"/>

Cleanliness:

Overall condition (was the decontamination performed prior to arrival on-site considered acceptable)? _____

Where was this equipment used prior to its arrival on site? _____

Site Contaminants of concern at the previous site? _____

Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls? _____

Flammable solvents stored in the operators cab? _____

Operator Qualifications (as applicable for all heavy equipment):

Does the operator have proper licensing where applicable, (e.g., CDL)? _____

Does the operator, understand the equipment's operating instructions? _____

Is the operator experienced with this equipment? _____

Is the operator 21 years of age or more? _____

ADDITIONAL INSPECTION REQUIRED PRIOR TO USE ON-SITE

YES

NO

Does equipment emit noise levels above 90 decibels? ☐ YES ☐ NO

If so, has an 8-hour noise dosimetry test been performed? ☐ YES ☐ NO

Results of noise dosimetry: _____

Defects and repairs needed: _____

General Safety Condition: _____

Operator or mechanic signature: _____

Site Health and Safety Officer Signature: _____

Approved for Use: ☐ Yes ☐ No

ATTACHMENT IV
SAFE WORK PERMITS

**SAFE WORK PERMIT
DECONTAMINATION ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. **Work limited to the following (description, area, equipment used):** Decontamination of heavy equipment and machinery (i.e., drill rigs and flights) will occur using pressure washers and/or steam cleaning units. This will be accomplished at a constructed temporary decontamination pad at the work site. Decontamination of sampling equipment will be decontaminated using buckets, brushes and spray bottles at the work site or designated location.
- II. **Primary Hazards:** Potential hazards associated with this task include lifting (strain/muscle pulls lifting heavy drilling equipment); Flying projectiles propelled by the force of the pressure washer/stream cleaner; noise in excess of 85 dBA; Burns/water lacerations; Stacked equipment - falling hazards; slips, trips, and falls – slippery surfaces. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards.
- III. **Field Crew:** _____
- IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☒ Yes ☐ No Initials of Inspector _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. **Protective equipment required** **Respiratory equipment required**
Level D ☒ Level B ☐ Yes ☐ Specify on the reverse
Level C ☐ Level A ☐ No ☒
Modifications/Exceptions: None anticipated

VII. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
<u>Liquinox (soap)</u>	<u>None Required</u>	<u>None</u>	<u>Eye irritant/flush with clean water</u>

Primary Route of Exposure/Hazard: Soap – Contact - Eye irritant; ingestion - nausea possible vomiting, diarrhea; Exposure to residual site contaminants during this activity is considered negligible.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. Additional Safety Equipment/Procedures

Hard-hat	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio/Cellular Phone.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Barricades	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type – Nitrile).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Impermeable apron	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots...	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Chemical Resistant Boot Covers.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Tape up/use insect repellent	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
First Aid Kit	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Fire Extinguisher.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shower/Eyewash.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Other	<input type="checkbox"/> Yes <input type="checkbox"/> No

Modifications/Exceptions: Impermeable aprons to control splashing/overspray. If this is inadequate replace with rainsuit or PE coated Tyvek. Hard hat, splash shield, hearing protection will be worn for pressure washer/steam cleaner operation. Gloves – Nitrile (surgeons style) or outer for deconning sampling (hand) tools, nitrile supported for steam cleaner/pressure washer operation. Overboots will be used when working in the temporary decon pad.

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Identified and Isolated (Splash and containment barriers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Construct pad as per Table 5-1 Decontamination. Use drying racks to secure heavy equipment to prevent items from falling during washing and drying. In addition, do NOT point the wand at other people or place it against any part of your body. Accidental compression of the trigger can cause water lacerations or burns. All hoses and fittings will be inspected to insure structural integrity prior to use. For pressure washers or steam cleaners in excess of 3,000 psi, a fan tip of 25° or greater will be used to control potential for water cuts or lacerations. A light coating of sand should be applied to the plastic liner should the surface becomes to slippery to prevent slips. Keep hoses gathered to prevent trips and falls. A site control boundary for this activity is 35-feet surrounding the point of operation. Follow MSDS for any decontamination solutions/solvents used.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
MOBILIZATION/DEMobilIZATION ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. **Work limited to the following (description, area, equipment used):** Mobilization and demobilization activities. These activities include site reconnaissance/site characterization, site preparation including the layout of sampling locations, securing the necessary utility clearances, and identifying/isolating physical hazards; Secure, construct, or equip decontamination facilities to support the field activities; Secure, construct, or equip IDW storage facilities to support the field activities.
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, cuts and lacerations, pinches and compressions; flying projectiles; slips, trips, and falls; insect and animal bites. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards. It should be noted that not every situation can be anticipated. Site personnel will therefore have to conduct on-site hazard assessments on a per task basis and employ controls as necessary.
- III. **Field Crew:** _____

- IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. **Protective equipment required** **Respiratory equipment required**
Level D ☒ Level B ☐ Yes ☐ See Reverse
No ☒

Modifications/Exceptions: None anticipated

- | | | | |
|---------------------------------|-------------------|-----------------|-------------------|
| VI. Chemicals of Concern | Hazard Monitoring | Action Level(s) | Response Measures |
| <u>None anticipated</u> | <u>NA</u> | <u>NA</u> | <u>NA</u> |

Primary Route of Exposure/Hazard: None

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. Additional Safety Equipment/Procedures

- | | |
|---|---|
| Hard-hat <input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses <input type="checkbox"/> Yes <input type="checkbox"/> No
Chemical/splash goggles..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash suits/coveralls <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Impermeable apron <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest..... <input type="checkbox"/> Yes <input type="checkbox"/> No
First Aid Kit <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shower/Eyewash..... <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs)..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Safety belt/harness..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Radio/Cellular Phone..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Barricades <input type="checkbox"/> Yes <input type="checkbox"/> No
Gloves (Type – <u>Leather/Cotton</u>) <input type="checkbox"/> Yes <input type="checkbox"/> No
Work/rest regimen <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical Resistant Boot Covers <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Tape up/use insect repellent <input type="checkbox"/> Yes <input type="checkbox"/> No
Fire Extinguisher..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Other <input type="checkbox"/> Yes <input type="checkbox"/> No |
|---|---|

Modifications/Exceptions: If there are Flying projectiles– Safety glasses and/or splash shield (i.e., hammering, power tool operation); If you have to raise your voice to be heard by someone within 2-feet of you hearing protection is required (i.e., equipment/power tool operation); If overhead hazards or bump hazards or you are working near operating equipment hard hats will be employed. If you are working in or near traffic patterns then wear High Visibility Vests. Use insect repellent and tape up to protect against insects and insect bites.

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| VIII. Site Preparation | Yes | No | NA |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Identified and Isolated | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Caution should be exercised if working along the water. The potential for natural hazards including snakes, alligators may exist given the region. .

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
MULTI-MEDIA SAMPLING ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. **Work limited to the following (description, area, equipment used):** Multi-media sampling includes Soil sampling collected using a MacroCore Sampler spoon/disposable trowels; Monitoring well development/hydraulic conductivity testing/groundwater sampling using 1-inch Whale pumps/surge blocks and peristaltic pumps.
- II. **Primary Hazards:** Potential hazards associated with this task include lifting (buckets of purge waters and moving drums), cuts and lacerations (cutting tubing), pinches and compressions opening MacroCore Samplers and handling containers); contact with contaminated media. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Inspector Initials TtNUS
Equipment Inspection required ☐ Yes ☐ No Inspector Initials TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**

Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required

Yes ☐ See Reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
Dust (Particulates – Lead)	Particulate meter	>1.0 mg/m3	Employ dust suppression –Wet it down

Primary Route of Exposure/Hazard: Lead – Exposure to lead may result in irritation of the mucous membranes of the respiratory tract, possible dryness of the throat, coughing, and sometimes accompanied by a metallic taste in the mouth. Gastrointestinal disturbances (nausea, vomiting, diarrhea, colicky abdominal pain) are characteristic of exposure through ingestion.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio/Cellular Phone	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield	<input type="checkbox"/> Yes <input type="checkbox"/> No	Barricades	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type – Nitrile surgeons).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Impermeable apron	<input type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe Work shoes or boots ...	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Chemical Resistant Boot Covers	<input type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tape up/use insect repellent	<input type="checkbox"/> Yes <input type="checkbox"/> No
First Aid Kit	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Fire Extinguisher	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shower/Eyewash.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Other	<input type="checkbox"/> Yes <input type="checkbox"/> No

Modifications/Exceptions: Hard hat, hearing protection, and safety glasses for sampling at the DPT/HSA rig; High Visibility Vests for high traffic areas; Tape up and use insect repellent to combat insect bites; Spiders and bees prefer well protective casings as nesting areas; Open wells and allow to vent/off gas 3-5 minutes while preparing your equipment from an upwind position.

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes Cleared and Established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

- X. **Special instructions, precautions:** Personal sampling at remote locations will bag contaminated PPE and reusable sampling tools. Use hygienic wipes for hands and face until persons can reach the structured decontamination unit. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for mobilization/demobilization. For remote locations pack glass ware in hard sided containers to prevent falls breakage of glassware and possible lacerations. Provisions for protection against the sun should be provided to site personnel including shade providing devices requirements for hats, sun block, wrap around sun glasses.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
MONITORING WELL INSTALLATION/SOIL BORING ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** Surface and subsurface soil samples will be acquired using DPT and MacroCore Samplers to continuously sample to the first water. Personnel will be required to meet the requirements of both the Safe Work Permit for Multi-media sampling and this Safe Work Permit. Monitoring well installation – Installation will be accomplished using HSAs. The well will be installed inside the augers as they are extracted. During the extraction of the augers sand is added to 2-feet above the screen, then a 2-foot bentonite seal, finished then with grout to the surface.

II. **Primary Hazards:** Potential hazards associated with this task include lifting (bags of sand, grout, auger flights and moving drums of soil), cuts and lacerations (cutting bags, well riser, etc.), pinches and compressions (wrenches slipping) and handling containers; pressurized systems (hydraulic lines); contact with contaminated media. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards. It should be noted that every situation cannot be anticipated therefore evaluated. Site personnel therefore may have to conduct hazard assessments on a per task basis and employ controls as necessary.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Inspector Initials _____ TtNUS

Equipment Inspection required ☒ Yes ☐ No Inspector Initials _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required

Yes ☐ See Reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
Dust (sand, grout, bentonite)	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down
Dust (Particulates – Lead)	Particulate meter	>1.0 mg/m3	Employ dust suppression –Wet it down

Primary Route of Exposure/Hazard: Lead – Exposure to lead may result in irritation of the mucous membranes of the respiratory tract, possible dryness of the throat, coughing, and sometimes accompanied by a metallic taste in the mouth. Gastrointestinal disturbances (nausea, vomiting, diarrhea, colicky abdominal pain) are characteristic of exposure through ingestion.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. Additional Safety Equipment/Procedures (Note to FOL and/or SHSO: Each item must be checked Yes or No)

Hard-hat	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio/Cellular Phone.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type – See Note)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Impermeable apron	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots...	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Chemical Resistant Boot Covers	<input type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tape up/use insect repellent	<input type="checkbox"/> Yes <input type="checkbox"/> No
First Aid Kit	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Fire Extinguisher.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shower/Eyewash.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Other	<input type="checkbox"/> Yes <input type="checkbox"/> No

Modifications/Exceptions: High Visibility Vests for high traffic areas; Tape up and use insect repellent to combat insect bites in forested or areas of heavy vegetation; Fire extinguisher for all vehicles in excess of 1-ton; Nitrile or neoprene supported gloves and impermeable aprons for handling contaminated auger flights, nitrile surgeon gloves for handling sampling tools and well screens and risers.

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes Cleared and Established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IX. **Additional Permits required** (Utility Locating and Excavation Clearance – Attachment II) . ☒ Yes ☐ No
If yes, SHSO complete permit or contact Health Sciences, Pittsburgh Office(412) 921-7090

X. **Special instructions, precautions:** Follow the safe work practices for drilling specified in Section 5.9 of this HASP. Use proper lifting techniques defined in Table 5-1 for mobilization/demobilization. Test all emergency stop devices initially then periodically to insure operational status. Identify a person on the field crew as the Emergency Stop Operator. Visually insure all persons are removed from rotating apparatus. Verbally alert all persons as to the activation of the augers. Remove jewelry, loose clothing and other entanglement hazards. Personnel decontamination will consist of disposing of single use PPE and washing hands and face prior to breaks or meals. The potential for exposure can occur only through mechanical dispersion (inhalation) or hand to mouth contact (ingestion) through poor work hygiene practices. Utility clearance will proceed all subsurface installation.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT
GEOGRAPHICAL SURVEYING ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. **Work limited to the following (description, area, equipment used):** Geographical surveying within a light industrial area. These activities include site reconnaissance, site preparation including the layout of control station as well as shooting vertical and horizontal control. In addition, fixed features such as intersections
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, cuts and lacerations, pinches and compressions; flying projectiles; slips, trips, and falls; insect and animal bites. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards. It should be noted that not every situation can be anticipated therefore evaluated. Site personnel will therefore have to conduct hazard assessments on a per task basis and employ controls as necessary.
- IV. **Field Crew:** _____
- IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
- Equipment Inspection required** ☐ Yes ☒ No Initials of Inspector _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. **Protective equipment required** **Respiratory equipment required**
- Level D ☒ Level B ☐ Yes ☐ See Reverse
- Level C ☐ Level A ☐ No ☒
- Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
<u>None anticipated</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

Primary Route of Exposure/Hazard: None

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. Additional Safety Equipment/Procedures

Hard-hat	<input type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Safety Glasses	<input type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio/Cellular Phone	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Gloves (Type – <u>Leather/Cotton</u>)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Impermeable apron	<input type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots ...	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Chemical Resistant Boot Covers	<input type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tape up/use insect repellent	<input type="checkbox"/> Yes <input type="checkbox"/> No
First Aid Kit.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Fire Extinguisher	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shower/Eyewash.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Other	<input type="checkbox"/> Yes <input type="checkbox"/> No

Modifications/Exceptions: Pant legs are to be taped to work boots to prevent entry under the clothing by ticks and other insects when working in heavy brush and wooded areas. Use insect repellants according to manufacturers recommendations. Tyvek coveralls may be used in heavy brush to protect against natural hazards (e.g., ticks) and also to make identification easier. If working in areas where snakes are a threat, wear snake chaps to protect against bites. Surveyors working along highways and traffic pathways shall wear high visibility vests to increase visual recognition. Safety glasses and Hard Hats should be worn when cutting sight lines; leather or cotton work gloves when cutting brush.

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Identified and Isolated.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
- If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Employ sharp tools for cutting brush, when not in use keep the sheath on the blade.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT
IDW MANAGEMENT ACTIVITIES
NAS PENSACOLA, PENSACOLA, FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. **Work limited to the following (description, area, equipment used):** IDW management activities includes containerization, staging, monitoring for leaks of IDW accumulated wastes. Wastes types include soil cutting, purge and decontamination wash waters.
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, pinches and compressions; flying projectiles; slips, trips, and falls. The direction provided in this HASP, Table 5-1 and this Safe Work Permit are directed at controlling these hazards. It should be noted that not every situation can be anticipated therefore evaluated. Site personnel will therefore have to conduct hazard assessments on a per task basis and employ controls as necessary.
- V. **Field Crew:** _____

- IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☒ No Initials of Inspector _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. **Protective equipment required** **Respiratory equipment required**
Level D ☒ Level B ☐ Yes ☐ See Reverse
Level C ☐ Level A ☐ No ☒
Modifications/Exceptions: None anticipated

- | | | | |
|---------------------------------|-------------------|-----------------|-------------------|
| VI. Chemicals of Concern | Hazard Monitoring | Action Level(s) | Response Measures |
| <u>None anticipated</u> | <u>NA</u> | <u>NA</u> | <u>NA</u> |

Primary Route of Exposure/Hazard: None

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. Additional Safety Equipment/Procedures

- | | |
|---|--|
| Hard-hat <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Safety Glasses <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Chemical/splash goggles <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Radio/Cellular Phone <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Splash Shield <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Barricades <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Splash suits/coveralls <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Gloves (Type – <u>Leather/Cotton</u>) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Impermeable apron <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Work/rest regimen <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Steel toe Work shoes or boots ... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| High Visibility vest <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Tape up/use insect repellent <input type="checkbox"/> Yes <input type="checkbox"/> No |
| First Aid Kit <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Fire Extinguisher <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Shower/Eyewash <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Other <input type="checkbox"/> Yes <input type="checkbox"/> No |

Modifications/Exceptions: If you are using pneumatic/electric power to open drums – Safety glasses are required; If power equipment is employed to move drums or you are working near operating equipment hard hats will be employed.

VIII. Site Preparation

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| | Yes | No | NA |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Identified and Isolated | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. When/where possible use heavy equipment to move and place containers. When placing drums – Place the label and retention ring nut on the outside where it is readily visible. Place 4-drums to a pallet. Maintain a minimum distance of 4-feet between pallet rows. An IDW inventory shall be generated to provide the number of drums, contents, and volumes. This inventory should be provided to the facility contact

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT V
MEDICAL DATA SHEET

MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by all onsite personnel and visitors who are cleared and will enter defined areas of operation. The medical data sheets will be kept in a central location during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project: NAS Pensacola; CTO 0355, Site 43

Name: _____ Home Telephone: _____

Address: _____

Age: _____ Height: _____ Weight: _____

Name of Next Kin: _____

Telephone Numbers: Home: _____ Work: _____ Cell: _____

Address _____

Drug or other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Overexposure to Hazardous Chemicals Resulting in signs and symptoms of overexposure and/or the necessity for Medical Attention and/or First-aid: _____

Do you have any medical restrictions? _____

Past Medical History/Review of Systems (Check if you have had positive history)

- | | |
|---|---|
| <input type="checkbox"/> Heart Conditions (Chest pains, angina, heart attacks) | <input type="checkbox"/> Endocrine (Thyroid, diabetes) |
| <input type="checkbox"/> Gastrointestinal Conditions (Ulcers, liver, GI Bleeding) | <input type="checkbox"/> Hematological (Clotting, anemia) |
| <input type="checkbox"/> Pulmonary (Difficulty in breathing, coughing, asthma, pneumonia) | <input type="checkbox"/> Cancer |
| <input type="checkbox"/> Neurological [Headaches, dizziness, strokes (CVA, TIA)] | <input type="checkbox"/> Muscular/Skeleton (Arthritis, Fractures, etc.) |
| <input type="checkbox"/> Kidney/Urological Disorder (kidney stones, renal failure) | <input type="checkbox"/> Other (Recent Illnesses, weight loss, fever, etc.) |

Comments: (Please explain positive indications): _____

Immunization History: Last Tetanus Shot or Booster (Date): _____ Pneumonia Vaccination (Date): _____

Flu Vaccination (Date): _____ Other: _____

Name, Address, and Phone Number of personal physician: _____

I am the individual described above. I have read and understand this HASP.

Signature

Date

ATTACHMENT VI

HEARING CONSERVATION PROGRAM

<u>SECTION</u>	<u>PAGE</u>
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2.0 SCOPE.....	1
3.0 RESPONSIBILITIES	1
4.0 MONITORING AND ESTABLISHING HIGH-NOISE AREAS.....	1
5.0 HEARING PROTECTION	2
6.0 TRAINING PROGRAM	2
7.0 RECORDKEEPING.....	2
8.0 ATTACHMENT	3
8.1 29 CFR 1910.95 Occupational Noise Exposure	4
8.1.1 Code of Federal Regulations, Subsection 1910.95	5

TETRA TECH NUS, INC.

HEARING CONSERVATION PROGRAM

1.0 PURPOSE

To establish general and site-specific hearing conservation procedures and guidelines.

2.0 SCOPE

Applies to all hazardous waste and other field activities where exposure to high levels of noise may occur. This program is designed to comply with OSHA General Industry Standard 29 CFR 1910.95.

3.0 RESPONSIBILITIES

Project Health and Safety Officer (PHSO) - The PHSO shall ensure that hearing conservation measures are adequately addressed in the Site Specific Health and Safety Plan.

Site Health Safety Officer (SHSO) - The SHSO is responsible for establishing and implementing a hearing conservation program. The SHSO also ensures that adequate procedures are followed to prevent excessive exposure of individuals to high levels of noise.

Project Manager (PM) - The PM will ensure that sufficient information has been provided to the PHSO to prepare adequate procedures for inclusion in the site-specific Health and Safety Plan (HASP). The PM is also ultimately responsible for the effective compliance with these requirements.

4.0 MONITORING AND ESTABLISHING HIGH-NOISE AREAS

4.1 The SHSO, as necessary, will perform an initial noise survey on Tetra Tech NUS and Subcontractors operations and work areas by the use of a sound meter and/or dosimetry. All monitoring will be done in accordance with 29 CFR 1910.95. Areas and operations which are expected to reach or exceed 85 decibels (dBA) will be required to adhere to the requirements for this program. It should be noted that both real-time as stated above and historical monitoring is sufficient for determining potential for excessive noise hazards.

4.2 The HASP will specify the tasks directing the mandatory use of hearing protection. The FOL and/or SHSO will notify all Tetra Tech NUS and Subcontractor personnel of high noise areas and operations prior to work initiation.

The FOL and/or the SHSO will be responsible for implementation and enforcement of the site-specific Hearing Conservation elements.

- 4.3** The FOL and/or the SHSO will post or otherwise identify areas of operations which exceed 85 dBA. If significant changes in noise levels occur (such as a shutdown in an operating unit, change in procedures), the noise levels shall be re-evaluated by the SSO to determine if hearing protection will be worn.

5.0 HEARING PROTECTION

Each employee will have the opportunity to choose from a variety of hearing protection devices. Hearing protectors shall be replaced as necessary. The SHSO with the assistance of the PHSO will evaluate the attenuation factors of hearing protection devices and will select appropriate types based on sound level monitoring or personal dosimetry.

6.0 TRAINING PROGRAM

The Health Sciences Department will institute and maintain an initial training program for new employees and provide an annual training program for employees who may be exposed to noise sources 85 dBA or greater. The annual training will be incorporated with the refresher health and safety training curricula. All affected employees will be involved in the program and their participation documented.

- 6.1** The training program shall include the effects of noise on hearing. It will also include the purpose of hearing protectors; the advantages, disadvantages, and attenuation factors of the various types. Instruction shall be given on audiometric testing, selection, fitting, use and care of hearing protectors.
- 6.2** A copy of the OSHA Noise Standard and applicable informational and training material will be available to all employees.

7.0 RECORDKEEPING

Exposure measurements, related records will be kept at the site. Record retention will be done in accordance with the time periods stated in 29 CFR 1910.95 and 1910.20.

8.0 ATTACHMENTS

- 8.1 29 CFR 1910.95 Occupational Noise Exposure
- 8.1.1 Code of Federal Regulations, Subsection 1910.95

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ATTACHMENT 8.1

29 CFR 1910.95 OCCUPATIONAL NOISE EXPOSURE

Site:		Type of Audio Monitoring Equipment:		Date:
Employee Name	Operation	Hearing Protection Type Attenuation Factor	Noise Levels Measured	Duration of Use

Forward completed table (with backup noise monitoring data) to the Manager, Health Sciences.

ATTACHMENT 8.1.1

CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95

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FR 5322, Feb. 10, 1984; 55 FR 32015, Aug. 6, 1990; 58 FR 35308, June 30, 1993]

TABLE G-16—PERMISSIBLE NOISE EXPOSURES¹

Duration per day, hours	Sound level dBA slow response
8.....	90
6.....	92
4.....	95
3.....	97
2.....	100
1½.....	102
1.....	105
½.....	110
¼ or less.....	115

§ 1910.95 Occupational noise exposure.

(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

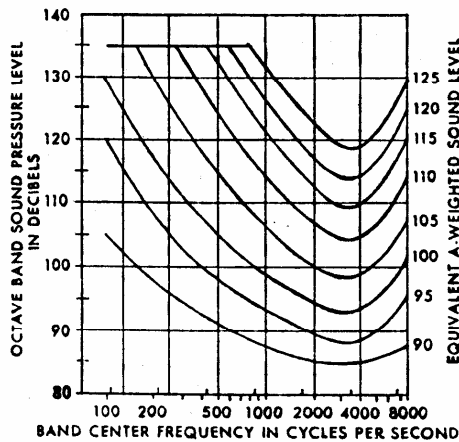


FIGURE G-9

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table G-16.

(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

¹ When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1 + C_2/T_2$, C_n/T_n , exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(c) Hearing conservation program.

(1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(2) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) *Monitoring.* (1) When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant variations in sound level, or a significant

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component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2)(i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) *Employee notification.* The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) *Observation of monitoring.* The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) *Audiometric testing program.* (1) The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

(3) Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using,

maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

(4) All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: *Audiometric Measuring Instruments*.

(5) *Baseline audiogram.* (i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

(ii) *Mobile test van exception.* Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

(iii) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(6) *Annual audiogram.* At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) *Evaluation of audiogram.* (i) Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has oc-

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curred. This comparison may be done by a technician.

(ii) If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(B) The baseline audiogram and most recent audiogram of the employee to be evaluated;

(C) Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

(8) *Follow-up procedures.* (i) If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

(ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a

medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

(iii) If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) *Revised baseline.* An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

(i) The standard threshold shift revealed by the audiogram is persistent; or

(ii) The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

(10) *Standard threshold shift.* (i) As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: *Calculation and Application of Age Correction to Audiograms.*

(h) *Audiometric test requirements.*

(1) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that

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meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: *Audiometric Measuring Instruments*.

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: *Audiometric Test Rooms*.

(5) *Audiometer calibration.* (i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: *Acoustic Calibration of Audiometers*. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

(iii) An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3.; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) *Hearing protectors.* (1) Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) *Hearing protector attenuation.* (1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: *Methods for Estimating the Adequacy of Hearing Protection Attenuation*.

(2) Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by paragraph (b) of this section.

(3) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) *Training program.* (1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

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(3) The employer shall ensure that each employee is informed of the following:

- (i) The effects of noise on hearing;
- (ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
- (iii) The purpose of audiometric testing, and an explanation of the test procedures.

(1) *Access to information and training materials.* (1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

(m) *Recordkeeping—(1) Exposure measurements.* The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) *Audiometric tests.* (i) The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

- (ii) This record shall include:
 - (A) Name and job classification of the employee;
 - (B) Date of the audiogram;
 - (C) The examiner's name;
 - (D) Date of the last acoustic or exhaustive calibration of the audiometer; and
 - (E) Employee's most recent noise exposure assessment.
- (F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

(3) *Record retention.* The employer shall retain records required in this paragraph (m) for at least the following periods.

(i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) *Access to records.* All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20 (a)-(e) and (g)-(i) apply to access to records under this section.

(5) *Transfer of records.* If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m) (3) of this section.

(n) *Appendices.* (1) Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

(o) *Exemptions.* Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.

(p) *Startup date.* Baseline audiograms required by paragraph (g) of this section shall be completed by March 1, 1984.

(Approved by the Office of Management and Budget under control number 1218-0048)

APPENDIX A TO § 1910.95—NOISE EXPOSURE COMPUTATION

This Appendix is Mandatory

I. Computation of Employee Noise Exposure

(1) Noise dose is computed using Table G-16a as follows:

(i) When the sound level, L, is constant over the entire work shift, the noise dose, D, in percent, is given by: $D = 100 C/T$ where C is the total length of the work day, in hours, and T is the reference duration corresponding to the measured sound level, L, as given in Table G-16a or by the formula shown as a footnote to that table.

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(ii) When the workshift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by:

$$D=100 (C_1/T_1+C_2/T_2+ \dots + C_n/T_n),$$

where C_n indicates the total time of exposure at a specific noise level, and T_n indicates the reference duration for that level as given by Table G-16a.

(2) The eight-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula: $TWA=16.61 \log_{10} (D/100)+90$. For an eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(3) A table relating dose and TWA is given in Section II.

TABLE G-16a

A-weighted sound level, L (decibel)	Reference duration, T (hour)
80.....	32
81.....	27.9
82.....	24.3
83.....	21.1
84.....	18.4
85.....	16
86.....	13.9
87.....	12.1
88.....	10.6
89.....	9.2
90.....	8
91.....	7.0
92.....	6.1
93.....	5.3
94.....	4.6
95.....	4
96.....	3.5
97.....	3.0
98.....	2.6
99.....	2.3
100.....	2
101.....	1.7
102.....	1.5
103.....	1.3
104.....	1.1
105.....	1
106.....	0.87
107.....	0.76
108.....	0.66
109.....	0.57
110.....	0.5
111.....	0.44
112.....	0.38
113.....	0.33
114.....	0.29
115.....	0.25
116.....	0.22
117.....	0.19
118.....	0.16
119.....	0.14
120.....	0.125
121.....	0.11
122.....	0.095
123.....	0.082

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TABLE G-16a—Continued

A-weighted sound level, L (decibel)	Reference duration, T (hour)
124.....	0.072
125.....	0.063
126.....	0.054
127.....	0.047
128.....	0.041
129.....	0.036
130.....	0.031

In the above table the reference duration, T, is computed by

$$T = \frac{8}{2^{(L-90)/5}}$$

where L is the measured A-weighted sound level.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level

Compliance with paragraphs (c)-(r) of this regulation is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with an audiodosimeter which gives a readout in terms of "dose." In order to better understand the requirements of the amendment, dosimeter readings can be converted to an "8-hour time-weighted average sound level." (TWA).

In order to convert the reading of a dosimeter into TWA, see Table A-1, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table G-16a. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and, a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-1, the TWA may be calculated by using the formula: $TWA=16.61 \log_{10} (D/100)+90$ where TWA=8-hour time-weighted average sound level and D=accumulated dose in percent exposure.

ATTACHMENT 8.1.1
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TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)

Dose or percent noise exposure	TWA
10.....	73.4
15.....	76.3
20.....	78.4
25.....	80.0
30.....	81.3
35.....	82.4
40.....	83.4
45.....	84.2
50.....	85.0
55.....	85.7
60.....	86.3
65.....	86.9
70.....	87.4
75.....	87.9
80.....	88.4
81.....	88.5
82.....	88.6
83.....	88.7
84.....	88.7
85.....	88.8
86.....	88.9
87.....	89.0
88.....	89.1
89.....	89.2
90.....	89.2
91.....	89.3
92.....	89.4
93.....	89.5
94.....	89.6
95.....	89.6
96.....	89.7
97.....	89.8
98.....	89.9
99.....	89.9
100.....	90.0
101.....	90.1
102.....	90.1
103.....	90.2
104.....	90.3
105.....	90.4
106.....	90.4
107.....	90.5
108.....	90.6
109.....	90.6
110.....	90.7
111.....	90.8
112.....	90.8
113.....	90.9
114.....	90.9
115.....	91.1
116.....	91.1
117.....	91.1
118.....	91.2
119.....	91.3
120.....	91.3
125.....	91.6
130.....	91.9
135.....	92.2
140.....	92.4
145.....	92.7
150.....	92.9
155.....	93.2
160.....	93.4
165.....	93.6
170.....	93.8
175.....	94.0

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
180.....	94.2
185.....	94.4
190.....	94.6
195.....	94.8
200.....	95.0
210.....	95.4
220.....	95.7
230.....	96.0
240.....	96.3
250.....	96.6
260.....	96.9
270.....	97.2
280.....	97.4
290.....	97.7
300.....	97.9
310.....	98.2
320.....	98.4
330.....	98.6
340.....	98.8
350.....	99.0
360.....	99.2
370.....	99.4
380.....	99.6
390.....	99.8
400.....	100.0
410.....	100.2
420.....	100.4
430.....	100.5
440.....	100.7
450.....	100.8
460.....	101.0
470.....	101.2
480.....	101.3
490.....	101.5
500.....	101.6
510.....	101.8
520.....	101.9
530.....	102.0
540.....	102.2
550.....	102.3
560.....	102.4
570.....	102.6
580.....	102.7
590.....	102.8
600.....	102.9
610.....	103.0
620.....	103.2
630.....	103.3
640.....	103.4
650.....	103.5
660.....	103.6
670.....	103.7
680.....	103.8
690.....	103.9
700.....	104.0
710.....	104.1
720.....	104.2
730.....	104.3
740.....	104.4
750.....	104.5
760.....	104.6
770.....	104.7
780.....	104.8
790.....	104.9
800.....	105.0
810.....	105.1

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TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
820	105.2
830	105.3
840	105.4
850	105.4
860	105.5
870	105.6
880	105.7
890	105.8
900	105.8
910	105.9
920	106.0
930	106.1
940	106.2
950	106.2
960	106.3
970	106.4
980	106.5
990	106.5
999	106.6

APPENDIX B TO § 1910.95—METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION

This Appendix is Mandatory

For employees who have experienced a significant threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protector attenuation.

The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This appendix describes four methods of using the NRR to determine whether a particular hearing protector provides adequate protection within a given exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using one of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data," HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method

#2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

NOTE: The employer must remember that calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn.

When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

(i) When using a dosimeter that is capable of C-weighted measurements:

(A) Obtain the employee's C-weighted dose for the entire workshift, and convert to TWA (see appendix A, II).

(B) Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(ii) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:

(A) Convert the A-weighted dose to TWA (see appendix A).

(B) Subtract 7 dB from the NRR.

(C) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iii) When using a sound level meter set to the A-weighting network:

(A) Obtain the employee's A-weighted TWA.

(B) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iv) When using a sound level meter set on the C-weighting network:

(A) Obtain a representative sample of the C-weighted sound levels in the employee's environment.

(B) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.

(v) When using area monitoring procedures and a sound level meter set to the A-weighting network.

(A) Obtain a representative sound level for the area in question.

(B) Subtract 7 dB from the NRR and subtract the remainder from the A-weighted sound level for that area.

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(vi) When using area monitoring procedures and a sound level meter set to the C-weighting network:

(A) Obtain a representative sound level for the area in question.

(B) Subtract the NRR from the C-weighted sound level for that area.

APPENDIX C TO § 1910.95—AUDIOMETRIC MEASURING INSTRUMENTS

This Appendix is Mandatory

1. In the event that pulsed-tone audiometers are used, they shall have a tone on-time of at least 200 milliseconds.

2. Self-recording audiometers shall comply with the following requirements:

(A) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10 dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at least ¼ inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2 dB in width.

(B) It shall be possible to set the stylus manually at the 10-dB increment lines for calibration purposes.

(C) The slewing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6 dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(D) The audiometer shall remain at each required test frequency for 30 seconds (± 3 seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than ± 3 seconds.

(E) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, such that the audiometric tracing crosses the line segment at least six times at that test frequency. At each test frequency the threshold shall be the average of the mid-points of the tracing excursions.

APPENDIX D TO § 1910.95—AUDIOMETRIC TEST ROOMS

This Appendix is Mandatory

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

TABLE D-1—MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS FOR AUDIO-METRIC TEST ROOMS

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62

APPENDIX E TO § 1910.95—ACOUSTIC CALIBRATION OF AUDIOMETERS

This Appendix is Mandatory

Audiometer calibration shall be checked acoustically, at least annually, according to the procedures described in this appendix. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by American Standard Specification for Audiometers, S3.6-1969.

(1) Sound Pressure Output Check

A. Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.

B. Set the audiometer's hearing threshold level (HTL) dial to 70 dB.

C. Measure the sound pressure level of the tones at each test frequency from 500 Hz through 6000 Hz for each earphone.

D. At each frequency the readout on the sound level meter should correspond to the levels in Table E-1 or Table E-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

(2) Linearity Check

A. With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.

B. Measure the sound levels in the coupler at each 10-dB decrement from 70 dB to 10 dB, noting the sound level meter reading at each setting.

C. For each 10-dB decrement on the audiometer the sound level meter should indicate a corresponding 10 dB decrease.

D. This measurement may be made electrically with a voltmeter connected to the earphone terminals.

(3) Tolerances

When any of the measured sound levels deviate from the levels in Table E-1 or Table E-2 by ± 3 dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibra-

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tion is advised. An exhaustive calibration is required if the deviations are greater than 15 dB or greater at any test frequency.

TABLE E-1—REFERENCE THRESHOLD LEVELS
FOR TELEPHONICS—TDH-39 EARPHONES

Frequency, Hz	Reference threshold level for TDH-39 ear- phones, dB	Sound level meter reading, dB
500.....	11.5	81.5
1000.....	7	77
2000.....	9	79
3000.....	10	80
4000.....	9.5	79.5
6000.....	15.5	85.5

TABLE E-2—REFERENCE THRESHOLD LEVELS
FOR TELEPHONICS—TDH-49 EARPHONES

Frequency, Hz	Refer- ence threshold level for TDH-49 ear- phones, dB	Sound level meter reading, dB
500.....	13.5	83.5
1000.....	7.5	77.5
2000.....	11	81.0
3000.....	9.5	79.5
4000.....	10.5	80.5
6000.....	13.5	83.5

APPENDIX F TO § 1910.95—CALCULATIONS AND
APPLICATION OF AGE CORRECTIONS TO AU-
DIOGRAMS

This Appendix Is Non-Mandatory

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in the criteria document entitled "Criteria for a Recommended Standard . . . Occupational Exposure to Noise," (HSM)-11001).

For each audiometric test frequency;

(1) Determine from Tables F-1 or F-2 the age correction values for the employee by:

(A) Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;

(B) Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.

(ii) Subtract the values found in step (i)(B) from the value found in step (i)(A).

(iii) The differences calculated in step (ii) represented that portion of the change in hearing that may be due to aging.

EXAMPLE: Employee is a 32-year-old male. The audiometric history for his right ear is shown in decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26.....	10	5	5	10	5
*27.....	0	0	0	5	5
28.....	0	0	0	10	5
29.....	5	0	5	15	5
30.....	0	5	10	20	10
31.....	5	10	20	15	15
*32.....	5	10	10	25	20

The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.

(The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:

Go to Table F-1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32.....	6	5	7	10	14
Age 27.....	5	4	6	7	11
Difference.....	1	1	1	3	3

The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audio-

ATTACHMENT VII

**FIRE EXTINGUISHER
USE AND INSPECTION**

FIRE EXTINGUISHER

USE AND INSPECTION

Fire Extinguisher Use and Inspection procedures will be conducted in support of the activities to be conducted at NAS Pensacola, Pensacola, Florida. The following text is intended to provide general instruction to the field personnel charged with this responsibility.

Fire Extinguisher Use

All personnel trained in incidental response measures may be required to use and operate a fire extinguisher in response to an incipient stage fire. Therefore, the following instruction is provided and will be conveyed to all field personnel as part of site-specific training.

To use a portable fire extinguisher, the user should be familiar with the operation of the specific fire extinguisher located in the workplace. The following procedure will properly extinguish a small fire.

- 1) IDENTIFY THE TYPE OF FIRE (CLASS A, B, C, D).

CLASSES OF FIRE/FIRE EXTINGUISHER IDENTIFICATION

Fire is divided into four classes for easy identification and extinguishment. The type of fuel or ignition source will determine the type of extinguishing medium required.

Class A - Ordinary combustibles (wood, paper, rubber, plastic, and cloth). Extinguishers suitable for Class A fires should be identified by a triangle containing the letter "A." If colored, the triangle is green.



ORDINARY
COMBUSTIBLES
(GREEN TRIANGLE)

Class B - Flammable liquids, gases, and greases. Extinguishers suitable for Class B fires should be identified by a square containing the letter "B." This type of extinguisher is effective on small petroleum product fires.



FLAMMABLE
LIQUIDS
(RED SQUARE)

Class C - Electrically energized systems. Extinguishers suitable for Class C fires should be identified by a circle containing the letter "C." If colored, the circle is blue.



ELECTRICAL
EQUIPMENT
(BLUE CIRCLE)

Class D - Combustible metals (sodium, magnesium, phosphorus). Extinguishers suitable for fires involving metals should be identified by a five-pointed star containing the letter "D." If colored, the star is yellow.

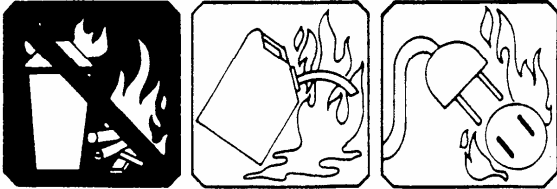


COMBUSTIBLE
METALS
(YELLOW STAR)

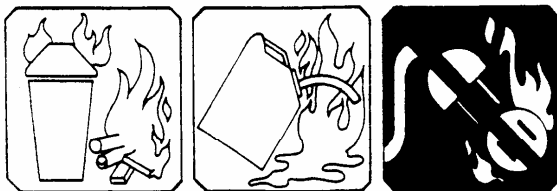
Note: Water and other extinguishing media, such as carbon dioxide and dry chemicals, are ineffective on metal fires.



Class A, B, C



Class B, C



Class A, B



Class A

Multi-class (ABC) Fire extinguishers will be provided for use on site. If you will buy a Fire Extinguisher, this is the type recommended. Size or rating recommended is 2 1/2 to 5 lbs.

1. Determine whether the extinguisher is adequate for this fire.

Rating number – The rating number assigned to a fire extinguisher is based on the capabilities of that fire class, for example

Class 5 A – Will provide extinguishing capabilities equal to that of 5 gallons of water.

Class 20 B - Will provide extinguishing capabilities equal to 20 square feet of flammable liquid burning.

Class C & D are not rated as to their limitations.

2. If adequate, hold the extinguisher upright and pull the ring pin.
3. Stand back 10 feet and aim at base of fire. Be careful not to spread burning material with pressurized extinguishing material.
4. Squeeze lever; sweep extinguisher in a side-to-side motion.

Portable Fire Extinguisher Placement/Mounting

Portable Fire Extinguishers will be placed/mounted in clear view in the areas where flammable materials are stored and/or dispensed. Mounting and placement of fire extinguishers will follow the following requirements

Fixed Locations (Flammable Storage)

- Extinguisher location will be marked by a red painted post or signage to indicate extinguisher location
- The travel distance to access a fire extinguisher shall be no greater than 50 feet.
- The fire extinguisher will be mounted at a maximum height of four feet.

Mobile Locations (Drill Rigs, Support Vehicles)

All vehicles carrying fuel containers or used in the dispensing of fuel will carry at a minimum a 5 pound rated fire extinguisher.

Portable Fire Extinguisher Inspection

All fire extinguishers used in support of this field effort will be inspected on the following frequencies:

- A certified provider will perform maintenance checks of fire extinguishers at least once a year. A tag attached to the neck of the fire extinguisher will indicate documentation of the maintenance check.
- All fire extinguishers will have a current hydrostatic inspection. For the type of extinguishers selected for use at NAS Pensacola hydrostatic inspections are required every 12 years.
- All fire extinguishers will be inspected monthly. The monthly inspection will cover the following
 - Are the fire extinguisher(s) placed in their designated location(s)?
 - Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red, signs, etc.)?
 - Is the access impeding travel to the fire extinguisher blocked or restricted in any way?
 - Has the fire extinguisher been partially or completely discharged?
 - Is there signs of obvious physical damage?
 - Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?

This inspection shall be documented on the attached tag provided by the maintenance/hydrostatic inspection service.

FIRE EXTINGUISHER CHECKLIST
NAS PENSACOLA, PENSACOLA, FLORIDA

Project Name: <u>NAS Pensacola</u>	CTO 0355	Date of Inspection: _____			
Fire Extinguisher Identification Number: _____		Fire Extinguisher Location: _____			
Measurement Criteria	Yes	No	N/A	Needs Repaired	
Are the fire extinguisher(s) placed in their designated location(s)?					
Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red, sign, etc.)?					
Is the access impeding travel to the fire extinguisher blocked or restricted in any way?					
Has the fire extinguisher been partially or completely discharged?					
Are there signs of obvious physical damage?					
Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?					

FIRE EXTINGUISHER CHECKLIST
NAS PENSACOLA, PENSACOLA, FLORIDA

Project Name: <u>NAS Pensacola</u>	CTO 0355	Date of Inspection: _____			
Fire Extinguisher Identification Number: _____		Fire Extinguisher Location: _____			
Measurement Criteria	Yes	No	N/A	Needs Repaired	
Are the fire extinguisher(s) placed in their designated location(s)?					
Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red, sign, etc.)?					
Is the access impeding travel to the fire extinguisher blocked or restricted in any way?					
Has the fire extinguisher been partially or completely discharged?					
Are there signs of obvious physical damage?					
Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?					